ORDER NO. VRD-8105-543

Service Manual

Color Video Camera

PK-751

Vol. 1	Vol. 2	Vol. 3	Vol. 4	Vol. 5
Summary *Technical Descriptions*	*Troubleshooting Guide* *Adjustment Procedures*	*Block Diagrams*	*Schematic Diagrams*	*Exploded Views* *Replacement Parts List*

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Vol. 1

Summary Technical Descriptions

SPECIFICATIONS:

Power Source:	DC 12V ± 10% AC 120V ± 10%, 60Hz ± 0.5% (with Power Supply Unit)
Power Consumption: (with E.V.F)	DC 7.2W at 12V (Battery) DC 0.7W at Standby
Vidicon Tube System:	2/3″ frequency separation single tube system (built-in stripe filter)
Signal Carrier Frequency:	3.58MHz
Focus System:	Electro-static type
Lens Mounting:	Built-in zoom lens (not "C" mount)
Lens:	6:1 zoom lens with auto/manual iris control. Auto zoom lens and macro construction. F: 1.6, f: 12mm—72mm d: 1m—infinity
Light Sensitivity:	Minimum light intensity on optical image: 80 Lux (F: 1.6) Optimum light intensity on optical image: 90 Lux
Video Output Level:	1.0Vp-p, 75Ω (M type coaxial connector) (Standard NTSC color signal)
Sync. System:	Internal Sync: RS-170
Signal to Noise Ratio:	Greater than 43dB (luminance signal)
Horizontal Resolution:	More than 240 lines
Color Temperature Control:	2 ~~step~~ switch (indoor, outdoor) & Auto adjust
Microphone:	Condenser Microphone
Audio Output Level:	−20dB, Hi-impedance
Audio Output Impedance:	High impedance (1KΩ)
External Microhpone Input Impedance:	600Ω
Electronic Viewfinder:	Monochrome 1.5 inch CRT
Operating Temperature:	5°C to 40°C
Operating Humidity:	10% to 75%
Operating Position:	Normal position only
Weight:	Camera Head with E.V.F 6.1 lbs (with Lens, 7ft cable & shoulder pad/handle grip) AC adaptor (option) 2.4 lbs
Demensions:	Camera Head with E.V.F 7″(W) × 8″(H) × 13″(D) 177mm(W) × 210mm(H) × 318mm(D) AC adaptor (option) 3″(W) × 3″(H) × 6″(D) 80mm(W) × 75mm(H) × 149mm(D)

Weight and dimensions shown are approximate.
Specifications are subject to change without notice.

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GENERAL INFORMATION AND FEATURES

This small, easy-to-carry Panasonic portable color video camera features a new 2/3 inch integral stripe filter vidicon, and is fully self-contained. It can receive its power from a Panasonic portable video cassette recorder or optional power supply/Camera AC adaptor.

The PK-751 is a high quality camera with an ALC (Automatic Light/Iris Control) zoom lens that produces 240 lines horizontal resolution*(B & W image) with the recommended illumination of 90 footcandles (900 lux). Minimum illumination is only 8 footcandles (80 lux) at F1.6.

The 1-3/8" (actual visual size measured diagonally) CRT viewfinder, can also be used for VCR playback. Synchronous audio and video recording are controlled by a single silent trigger located on the camera handgrip.

***B & W Image:**
Black and white or luminance (the technical term) is used for the purpose of measuring the amount of detail that this camera will produce when using a resolution chart and Video Monitor.

Features

Electronic viewfinder
The electronic viewfinder allows you to see exactly what the camera lens sees. Inside the viewfinder there is one LED indicating insufficient light intensity, one LED for indicating VCR remote control status and one LED for white balance control status.

Zoom lens with Power zoom and MACRO function.
6:1 zoom lens with Power zoom allows you to "zoom-in" for a closer picture. This is simply done by pressing the Power zoom switch. Also, close-up pictures can be achieved by using MACRO function.

Automatic iris control
Automatic iris control adjusts the amount of light entering the camera to provide the proper picture contrast.

Automatic white balance control
Optimum color pictures can be achieved under varying lighting conditions.

Boom microphone
Sound as well as pictures can be recorded at the same time because the camera contains a built-in microphone that can also be extended to distinctly pick up sounds.

Standby switch
The standby switch is for saving battery power when the recording is in the pause mode for a long period.

AGC ON/OFF Switch
Camera gain can be increased for use in low light conditions.

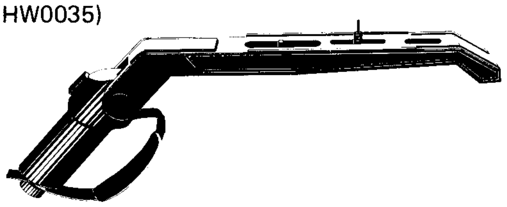
Fader switch
The picture automatically fades in or fades out every time you push the VCR remote control switch.

Optional Remote Control
The optional remote controller allows remote operation of CUE and REVIEW of a PV—4000 series portable recorder.

ACCESSORIES

Accessories included:
Standard accessories (supplied)
Camera Unit (PK—751) . . 1 pc
Electronic Viewfinder (PK—M051) . . 1 pc

Shoulder pad with handle grip
(VYHW0035)



Optional accessories
- *10-pin extension camera cable (approx. 6m, 20 ft) (20H—20R)
- *Holder Pod (PK-T001S)
- *AC Adapter (PK—A789) with 3 cables
- *Tripod/monopod (PK—T008)
- *Remote controller for PV—4000 series

PRECAUTIONS

The PK-751 is a sensitive, high quality instrument and should be regarded as such. Because it is an electrical device, the danger of electric shock exists if it is used carelessly.

DON'TS

×Do not attempt to disassemble the camera or power supply. In order to prevent electric shock, do not remove screws or covers. There are no user-serviceable parts inside.

×Do not abuse the camera. Avoid striking, shaking etc. The camera contains a sensitive pick-up tube which could be damaged by improper handling or storage.

×Do not let the lens remain uncapped when the camera is not in use.

×Do not touch the surface of the lens with your hand.

×Do not use strong or abrasive detergents when cleaning the camera body.

×Do not aim the camera toward the sun or other extremely bright objects, whether it is turned on or not. This action could permanently damage the pick-up tube.

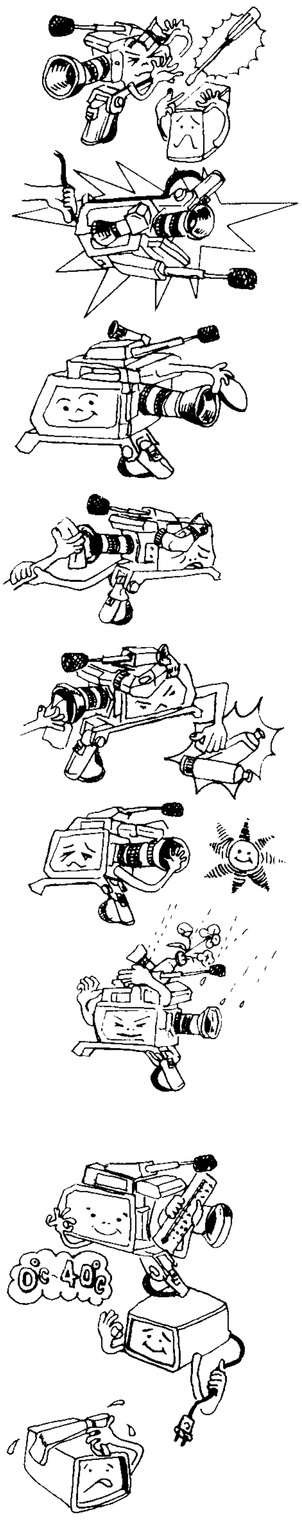
×Do not expose the camera or power supply to rain or moisture, or try to operate it in wet areas. Do not operate the camera or power supply if it becomes wet.

×Do not use the camera in an extreme environment where high temperature or high humidity exist.

×Do not try to operate the camera and power supply on power line voltages other than 120V AC±10% at 60 Hz.

×Do not leave the camera and power supply turned on when not in use.
Do not turn the power on and off repeatedly without use. Do not block the ventilation slots.

×Do not store the camera under conditions where temperatures are over 149° F (65°C).



DO'S

•Do refer any servicing to qualified service personnel.

•Do handle the camera with care.

•Do protect the precision lens by placing the lens cap over the lens when the camera is not in use.

•Do use a mild blower or lens cleaning paper designed for coated lenses to clean the surface of the lens or pick-up tube in the event that they become dirty.

•Do use a dry cloth to clean the camera when dirty. In case the dirt is hard to remove, use mild detergent and wipe gently.

•Do use caution when operating the camera in the vicinity of spot lights or other bright lights, and light reflecting objects.

•Do take immediate action if ever the camera or power supply do become wet. Turn power off and dry them thoroughly before using again. Moisture can damage the camera and power supply and also create the danger of electric shock.

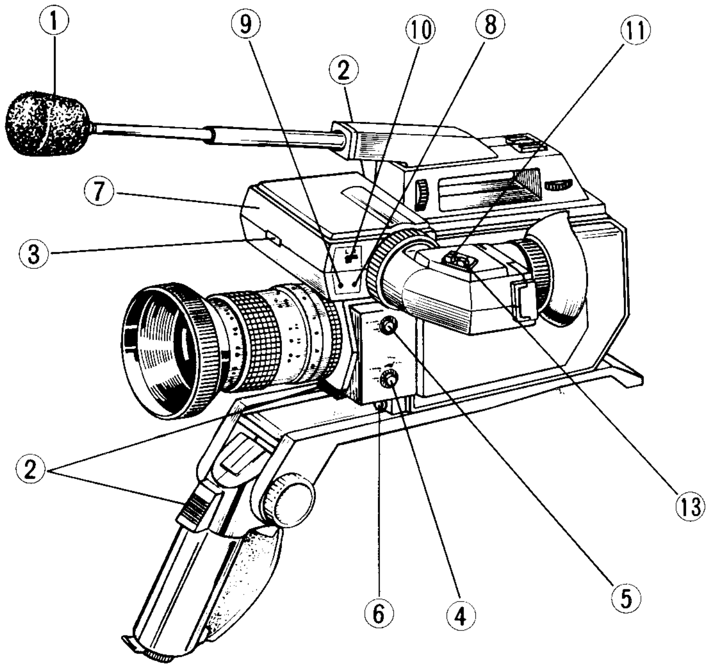
•Use the camera under conditions where temperatures are within 32°F ~ 104° F (0°C ~ 40°C), and humidity is below 75%.

•Use the camera and power supply only with the proper line voltage.

•Always turn the power off when the camera is not going to be used, this will extend the life of the pick-up tube. Operate the camera and power supply only where there is adequate ventilation.

OPERATING COMPONENTS AND THEIR FUNCTIONS

A. Camera Head



① **Boom Microphone**

To record audio while the picture is recorded. Extend out the boom microphone to distinctly pick up sounds when recording.

② **VCR Pause Switches (pause trigger)**

The trigger operated switch is used to place the VCR in the pause mode while focusing or adjusting the camera. These switches are located on the camera head, on the handle grip and on the Electronic Viewfinder.

③ **Tally Light (VCR remote control status LED)**

The tally light (red) flashes while recording so that person before the camera can recognize that recording is actually in progress.

④ **Auto/Manual Iris Control Switch**

This switch selects the lens iris control for MANUAL or AUTO.

(1) When setting to the "AUTO" position, the auto-iris automatically adjusts the lens opening or aperture to admit the proper amount of light for the camera.

(2) When setting to the "MANUAL" position, the lens iris can be manually adjusted.

⑤ **Color Temperature Correction Switch (Filter selection)**

Optimum color pictures can be achieved for varying light conditions.
This switch selects the approximate corrections for indoor or outdoor.
Set to "OUTDOOR" for outdoor use and set to "INDOOR" for indoor use.

⑥ **Automatic White Balance Control (A.W.C.) Switch**

The camera has an Automatic White Balance Control circuit. White balance is automatically set by pushing the A.W.C. switch, after making the proper selection of color temperature correction switch. Also the A.W.C. indicator on the EVF glows green when the white balance is automatically set.

It is recommended that the A.W.C. switch is repushed to adjust the white balance whenever the scene is changed.

⑦ Electronic Viewfinder

This is a small TV monitor which shows the actual picture that the lens sees.

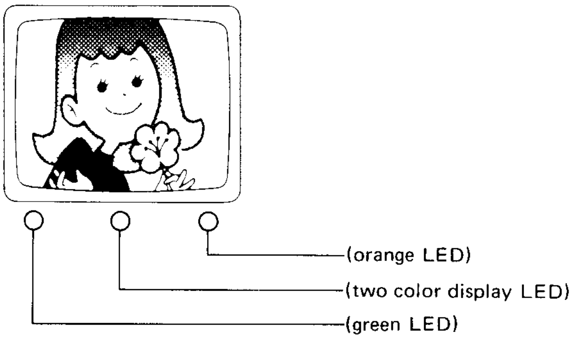
This Electronic Viewfinder is attachable to either side of the camera head considering right or left hand operation.

a) Light intensity indicator

This indicator consists of one LED that, when illuminated, indicates insufficient light for producing a quality picture. The camera has an Automatic Iris Control Circuit. It makes sure that the iris is opened for proper exposure and under sufficient light conditions, turning off the orange light. Therefore, when the orange light is on, the light intensity is insufficient. Adjust the brightness and contrast of the Electronic Viewfinder picture only when the orange light is off. These controls are located on the side of the viewfinder. Use a small screw driver to adjust these controls.

Note: It is not necessary to adjust these controls under normal circumstances. But, should it become necessary it is recommended that you use a plastic screw driver and make the adjustment with caution so as not to damage the miniature controls.

Viewfinder Picture Tube



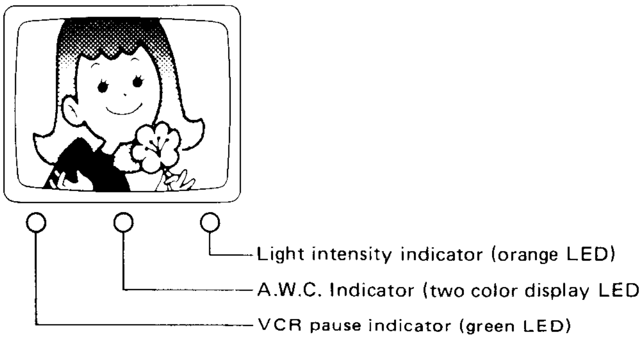
When the orange LED lights, illumination is too low.
Provide more illumination.

b) A.W.C. Indicator (Automatic White Balance Control)

This indicator is a two-color LED which is used with the Automatic White Balance Control. The LED glows RED when the camera is turned on. This means that the white balance hasn't been set yet. Before you are ready to shoot – press the A.W.C. button. While the white balance is automatically being adjusted – the LED flashes RED – GREEN – RED – GREEN, etc. The LED will glow GREEN when the white balance is set. Set A.W.C. again if the lighting is changed.

c) VCR pause indicator

This green indicator is on when the recording is in progress.


Light intensity indicator (orange LED)
A.W.C. Indicator (two color display LED
VCR pause indicator (green LED)

⑧ Brightness Control

This control adjusts for brightness of the electronic viewfinder picture. Adjust gently with a small screw driver.

⑨ Contrast Control

This control adjusts for contrast of the electronic viewfinder picture. Adjust gently with a small screw driver.

⑩ Picture turning switch

This switch is used to invert the picture on the EVF and should be switched only with power off.

(1) Set to the "R" position for right hand operation.
(2) When the EVF is mounted for left hand operation, the viewfinder picture is upset down. Accordingly set to the "L" position so that the picture on the EVF can be seen in normal condition. This switch does not affect the picture which is recorded.

⑪ Power Zoom Speed Selection Switch

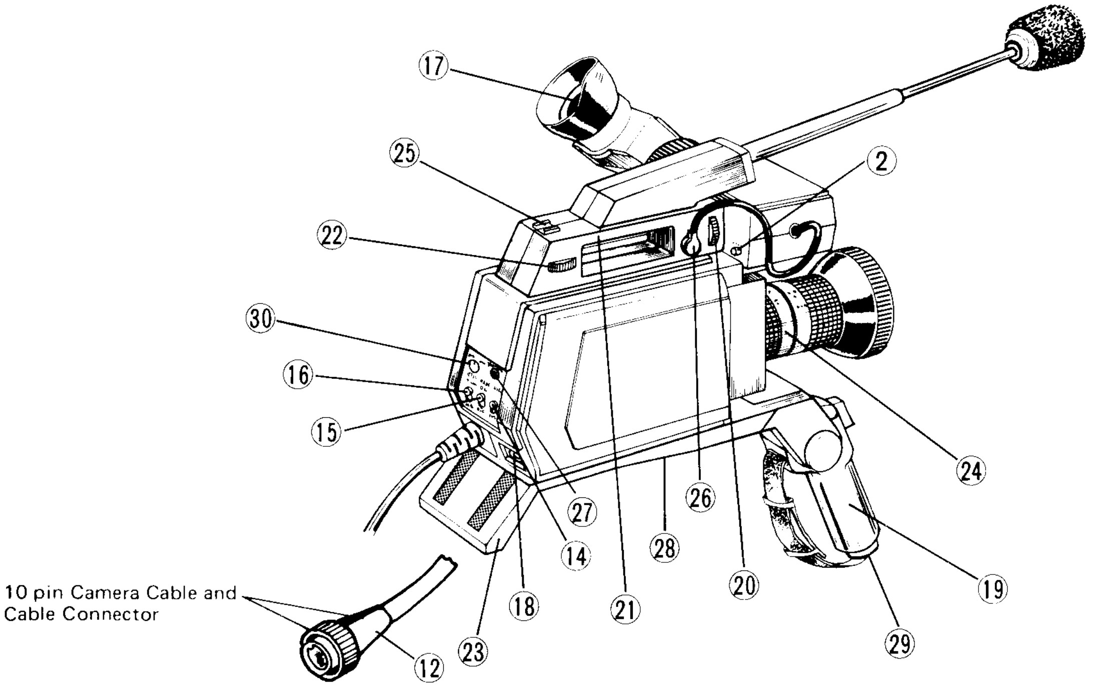
This camera has a power zoom lens with two step speed.

Select the desired zooming speed.

FAST: approx. 6 seconds from zoom-in/out to zoom-out/in.
SLOW: approx. 10 seconds from zoom-in/out to zoom-out/in.

⑫ Camera Cable

This 7 foot long cable is used to provide the interconnections between the camera and portable VCR.



⑬ **Power Zoom Switch**

This switch works in conjunction with the zoom lens, and allows you to "Zoom-in" (Telephoto or T position) or "Zoom-out" (Wide Angle or W position) by pressing it.

⑭ **Standby Switch**

This switch is used for longer battery operation. Set this switch to "Standby" when leaving the camera in the pause mode for a long period.
The picture disappears on the Electronic viewfinder when setting this switch to "Standby". When the standby switch is set to "Operate", the camera and portable VCR operate normally.

⑮ **Fader Switch**

This fade-in/out functions in conjunction with the VCR remote control switch on the camera head. When setting this switch to the "ON" position, the picture automatically fades in or fades out every time you push the VCR remote control switch. Fade-in time is approx. 8 seconds and fade-out time is approx. 5 seconds.

⑯ **AGC ON/OFF Switch**

This switch changes the camera's automatic gain control (AGC) for use in low light situations. Set this switch "ON" when the orange LED indicating insufficient light intensity stays on. In normal circumstances keep the switch "OFF"

⑰ **Viewfinder Picture Tube**

The 1.5" picture tube will show the actual scene the camera "sees".

⑱ **External Microphone Input**

Accommodates an external microphone to permit closer audio pick-up. The built-in boom microphone is automatically disconnected when the external microphone is plugged in. Use a microphone with 600 ohm impedance.

⑲ **Adjustable Handle Grip & Knob**

This grip is used for holding the camera and is tiltable for easy holding and operation. The grip should be firmly tightened by turning the knob.

⑳ **EVF Mounting Roller**

This roller tightens the EVF to the camera head firmly.

㉑ **Adjustable Carrying Handle**

This handle is useful when hand carrying the camera and is adjustable to afford the most comfortable position. Loosen the Handle Fixing Roller and simply slide in or out for your comfort.

㉒ **Carrying Handle Fixing Roller**

This roller tightens the carrying handle to the camera head.

㉓ **Shoulder pad**

This shoulder pad is useful when recording without a tripod and is adjustable for comfortable position.

㉔ **Macro Position**

For close up pictures down to a distance of 2 in. Pull the zoom lever to set the zoom ring to the Macro position.

Note: Make sure the illumination on the subject is sufficient for close up shooting.

㉕ **Accessory Shoe**

This shoe is for attaching the optional camera remote control unit to the camera head.

㉖ **Electronic Viewfinder Connector**

This is a receptacle for the connection of the electronic viewfinder.

㉗ **Camera Remote Control Connector**

This is a receptacle for the connection of the camera remote control unit. Remove the cap when using this connector.

㉘ **Tripod Mounting Hole**

This hole is used for mounting the camera on a tripod with standard 1/4-20 thread.

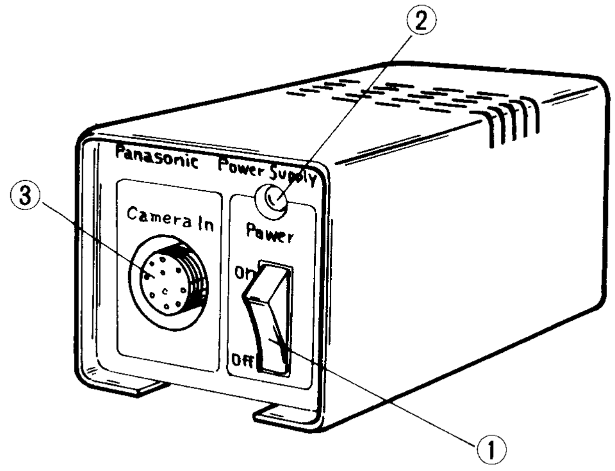
㉙ **Holder Pod Mounting Hole**

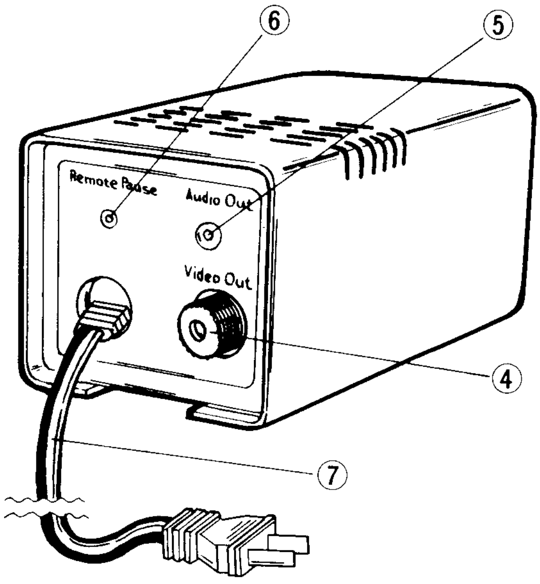
This hole is used for a holder pod.
This hole should not be used to mount the camera on a tripod.

㉚ **Color Control Knob**

The red and blue color are balanced and preset at the center (detent) position which usually will provide accurate color reproduction. When used indoors, the color balance control can be adjusted while viewing a TV.

B. POWER SUPPLY (optional)





① **On/Off Switch**

This switch turns the color camera system power on and off.

② **Power Indicator Light**

This lamp lights when power is on.

③ **Camera Input Connector (Camera In)**

Connect the camera 10 pin cable connector here. Be sure the cable connector is fitted securely to the input connector.

④ **Video Output Connector (Video Out)**

The video output connector supplies NTSC color signal to the VCR. Connect the silver end of the video cable here. The white end should be connected to the video input connector on back of the video cassette recorder.

⑤ **Audio Output Connector (Audio Out)**

This connector supplies an audio signal from microphone to the VCR. Connect one end of the audio cable to the power supply, the other end to the audio in connector on back of the recorder. This cable can be identified by its red end.

⑥ **Remote Pause Connector (Remote Pause)**

This connector connects to the VCR with the remote control cable, in order to pause the VCR from the camera head.

Connect one end of the remote pause cable to this connector, the other end of the cable to the remote pause connector on back of the video cassette recorder. This cable can be identified by its black end.

⑦ **Power Cord Plug**

Connect the two prong polarized plug to a wall socket (120VAC). If the socket works for an ordinary table lamp, for instance, it is right for your unit.

NOTE:

This Power Supply must be used when connections are made to a Video Tape Recorder (VCR) that does not have a 10 pin connector.

These cables are included with the power supply.

Audio cable (Red connectors) (VJAK0118)

Remote pause cable (Black connectors) (VJAK0115)

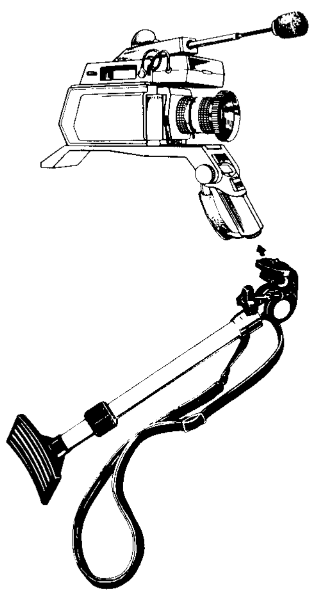
Video cable (One end has a white connector, the other has a silver connector) (VECK126)

MOUNTING THE CAMERA ON THE TRIPOD OR HOLDER POD

The camera may be attached to a tripod when you wish to make recordings while not holding the camera or if you need to keep the camera very steady while recording.

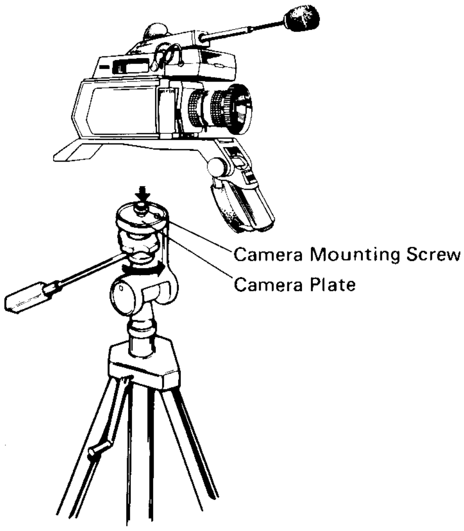
1. TO USE THE HOLDER POD (PK–T001S)

Attach the camera mounting screw of the holder pod to the mounting hole located on the bottom of the handle.



2. MOUNTING THE CAMERA ON A TRIPOD

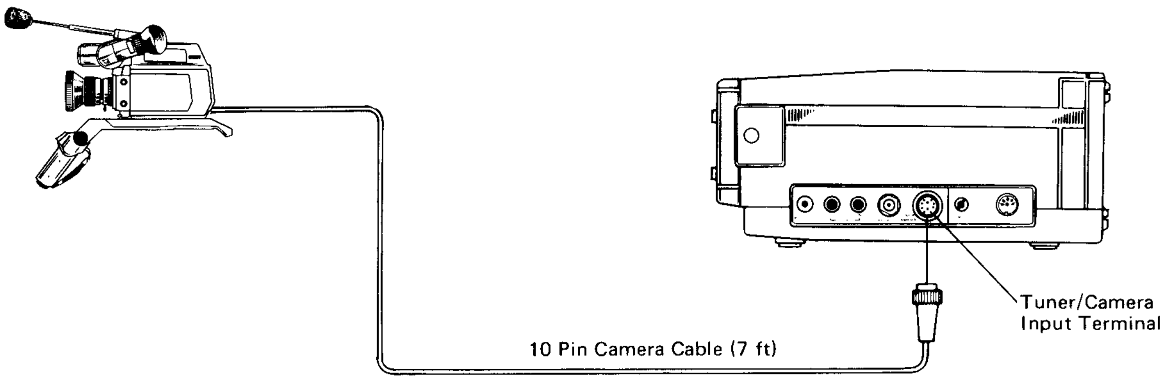
Mount the camera with shoulder pad onto the tripod by screwing the mounting screw on the tripod (standard 1/4"-20 thread) into the mounting hole on the shoulder pad. You may mount the camera onto the tripod without shoulder pad.



Be sure that the camera is securely fastened.
Be sure that the tripod is sturdy enough to hold the camera.

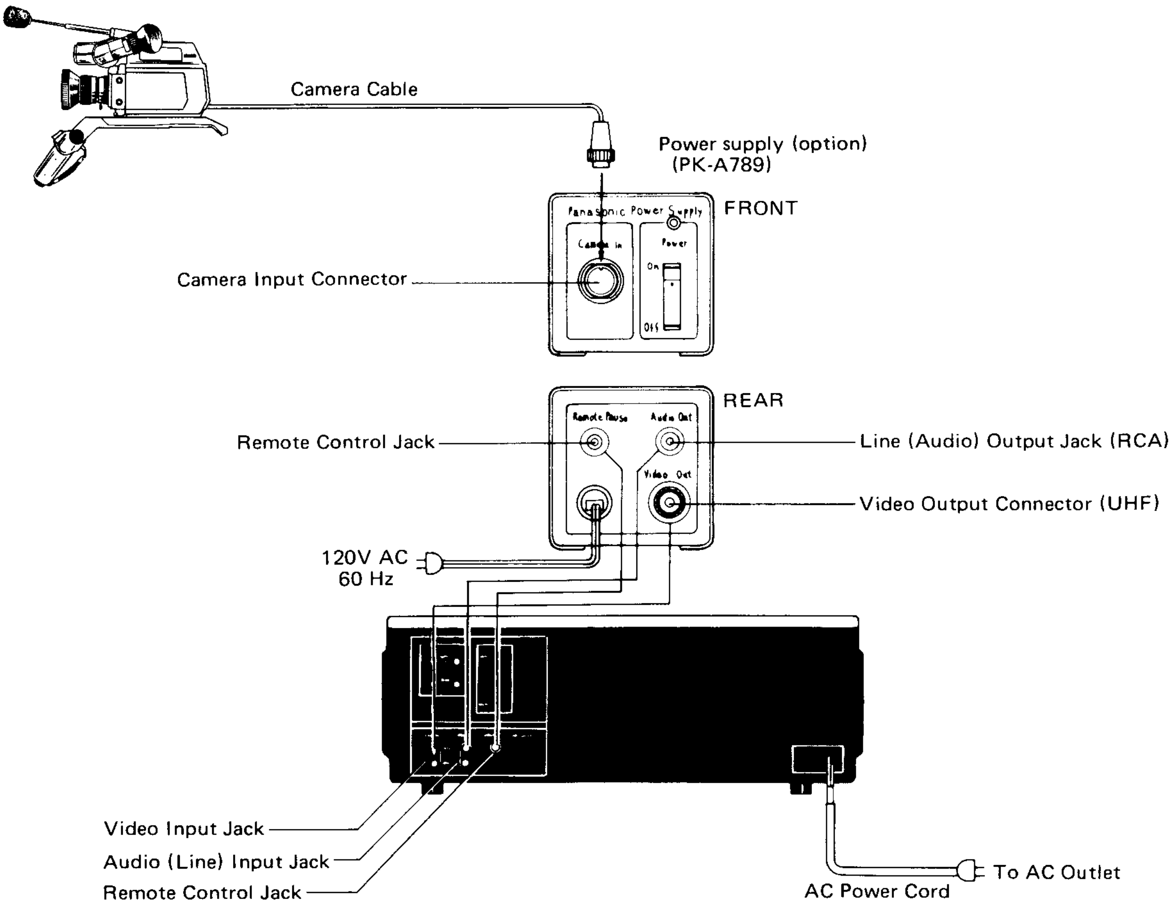
CONNECTION DIAGRAM

A: Camera Head and portable VCR


Tuner/Camera
Input Terminal
10 Pin Camera Cable (7 ft)

Connect the camera cable to 10-pin socket on portable VCR as illustrated. Be sure to connect the camera to the portable VCR before turning on the power switch on the portable VCR. If the switch is turned on prior to connecting the cable, trouble could develop.

B: Camera Head, optional power supply and VCR without 10-pin connector


Camera Cable
Power supply (option)
(PK-A789)
FRONT
Panasonic Power Supply
Camera In
Power
On
Off
Camera Input Connector
REAR
Remote Pause
Audio Out
Video Out
Remote Control Jack
Line (Audio) Output Jack (RCA)
Video Output Connector (UHF)
120V AC
60 Hz
Video Input Jack
Audio (Line) Input Jack
Remote Control Jack
AC Power Cord
To AC Outlet

1. Connect the camera cable from the camera head to the 10-pin camera socket on the power supply, (PK–A789). (Make sure that the power switch of the power supply is turned off before connecting the cable.)
2. Connect the video cable from the VIDEO OUT socket (UHF connector) on the power supply to the VIDEO IN connector (RCA phono connector) on the VCR.
3. Connect the audio cable from the AUDIO OUT connector on the power supply to the AUDIO IN connector on the VCR.
4. Connect the VCR remote control cable from the REMOTE connector on the power supply to the REMOTE PAUSE connector on the VCR.
5. Plug in the power plug of the power supply into wall socket (120 Volts ± 10%)
6. Insert the AC power plug of the VCR into the wall socket.

Notes:

1. The camera cable between camera head and power supply or between camera head and portable VCR can be extended by using the optional extension camera cables.
   (Use three 20 feet extension cables to extend upto 67 feet)
2. The connections between the VCR and TV set are explained in the operating instructions for the VCR.

C: Camera Head and Electronic Viewfinder

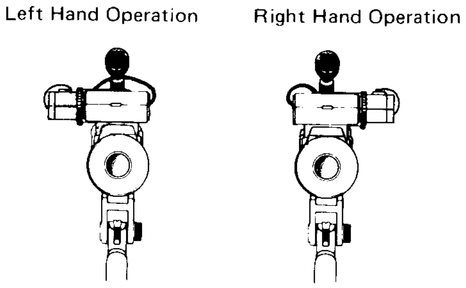
The Electronic Viewfinder is attachable to either side of the camera head for easy operation.
The following is the installation procedure for right hand/eye operation.

1. Attach the Electronic viewfinder to the camera head and tighten the EVF Mounting roller firmly.
2. Plug the connecting cable on the Electronic Viewfinder into the connector on the camera head.
3. Set the picture turning switch to the "R" position.

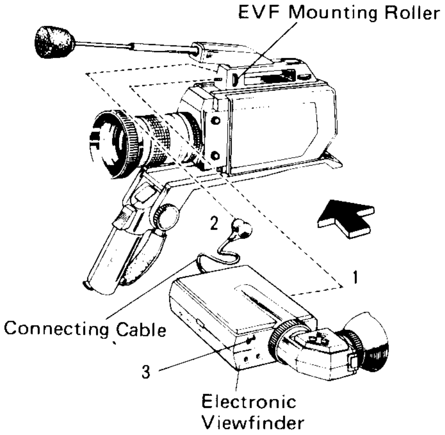
Note:

The above procedure is for mounting the Electronic Viewfinder for right hand and right eye use.
When mounting the Electronic Viewfinder for left hand and left eye use, unscrew the EVF Mounting roller, flip the viewfinder over and reattach by following the same procedure.

Also, rotate the eye cap on the Electronic Viewfinder so that it may fit to your own eye.
The picture turning switch should be switched only with power off. If the picture in the viewfinder is upside down, you have the turning switch in the wrong position.
Turn power off, and move the turning switch to the correct position.

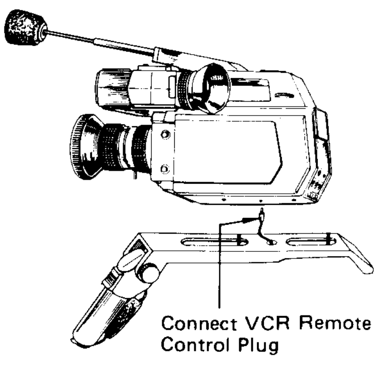


Front View of Camera



D: Camera Head and Shoulder Pad

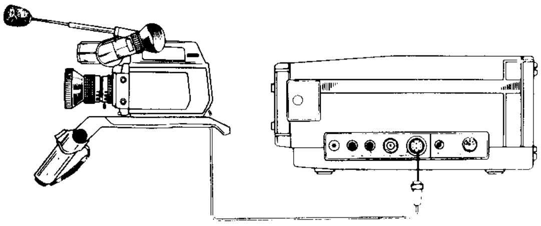
1. Plug in the VCR remote control connector into the connector on the bottom of the camera head.
2. Attach the Shoulder Pad onto the bottom of the camera head and tighten the screws on the Shoulder Pad at a comfortable position.



OPERATING PROCEDURE

Caution:

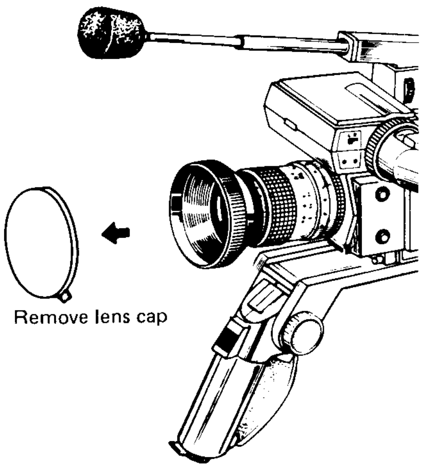
Never direct the camera at the sun or other strong light source even when the camera power is turned off. Also do not direct it at objects that reflect intense light (glass, metal, etc.).
If strong light enters the camera, it could burn the expensive vidicon, rendering it useless.



1. Connect the camera and portable VCR as previously shown.

2. Remove the lens cap.

3. Turn the power switch of the VCR on, and press the Rec and Play buttons simultaneously.
   - On some VCR models you may have to switch the input selector to the camera position.



4. Confirm that the VCR remote indicator (green LED) on the Electronic Viewfinder is turned off. If the green LED is on, depress the VCR pause switch on the camera. (If the green LED lights, actual recording is being made.)

5. Select the Color Temperature Correction switch for indoor or outdoor use.

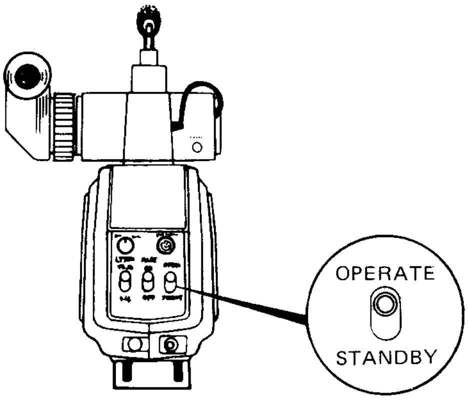
   Note: For additional information regarding lighting, turn to page 18.

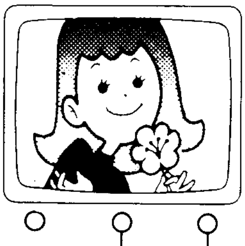
6. Set the Standby switch to the"Operate" position.

   Note: To save power while preparing to record, it is better to use the STAND BY SWITCH in order to only preheat the vidicon of the camera to save battery power.

7. Confirm that the orange LED indicator is not illuminated. This indicates that light intensity to the camera lens is proper.
   Orange LED on . . . . . . need more incoming light.

8. Press the Power Zoom Switch ("T" side) for maximum close-up. Adjust lens focus for the sharpest picture. Focus will now track over the entire zoom range.



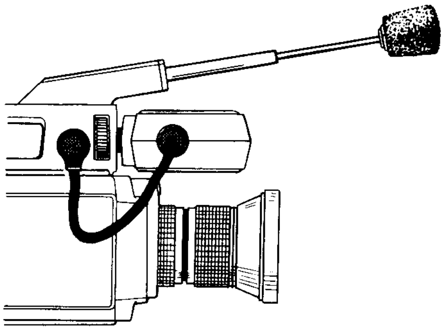


9. Aim the camera at a white object (never at a light source). White lens cap may be placed on the lens if there is no white object.
   Push the A.W.C. switch to adjust the white balance.
   And wait for the A.W.C. indicator on the EVF to glow green.
   Note: It is recommended that the A.W.C. switch is repushed to adjust the white balance every time a new scene is selected.

10. Depress the VCR pause switch on the camera. The remote pause indicator light will light as the recorder begins to record.

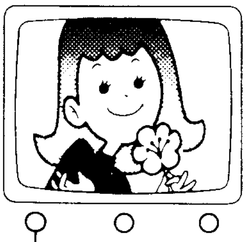
11. Depress the VCR pause switch on the camera to pause the recorder anytime. Depress the switch again to resume recording.

12. Instant Replay.
    To watch the program just recorded, rewind the tape, then press the Play button. The playback picture appears automatically on the viewfinder of the camera when connected to the portable VCR. When the power supply is used this feature does not function.



13. STANDBY Setting
    Employ the STANDBY switch to avoid unnecessary power consumption when you expect to pause the recording more than a couple of minutes.
    1. Pause the recording by pressing the VCR pause switch on the camera.
    2. Set the standby switch to the "STANDBY" position during the pause mode.
    3. Set the standby switch to the "Operate" position just before the recording is resumed. Wait for the viewfinder picture to appear.
    4. Resume the recording by repressing the VCR pause switch on the camera.

    Please note that video noise during playback may appear on the monitor if you do not follow this procedure. Operations can't be performed when the camera is set to the "STANDBY" position when operating with a portable VCR.



ON – Tape is rolling
OFF – Tape is paused

14. AGC
    The camera sensitivity can be increased for use in low light conditions.
    In adequate lighting conditions, it is preferable not to use this boost.

Note:
1. Focus should be adjusted all the way at the zoomed-in (telephoto) position. Focus should then track over the entire zoom range. When the camera is aimed at a new scene or object, refocusing will be required.
2. Always replace the lens cap when the camera is not in use.

DESCRIPTION OF FUNCTIONS

●Macro

The PK–751 lens, with Macro capability, allows the user to reduce the minimum focal point of the lens and therefore permits good focusing on subjects at a very short distance from the lens.

Macro function is really a special effect and should not be used for normal camera shots. The definition for Normal and Macro are as follows:

NORMAL	MACRO
Subject to Lens distance is Greater than 1 meter	Subject to Lens distance is Less than 1 meter

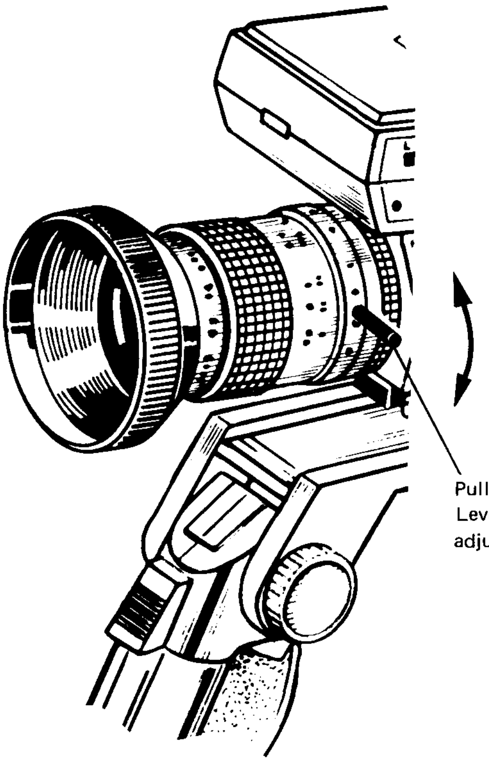
TO USE MACRO:

1. Press the Power Zoom Switch to obtain the widest position.

2. Pull the Zoom Lever out; then turn Zoom Ring for best Macro focus.

3. Subject to lens distance should be 1 meter or less. You will notice that a slight change in subject to lens distance will change the Macro focus considerably.

4. To return to normal – place the Zoom Ring back to its normal position and allow the Zoom Lever to reseat.



Pull Zoom
Lever out, then
adjust macro focus

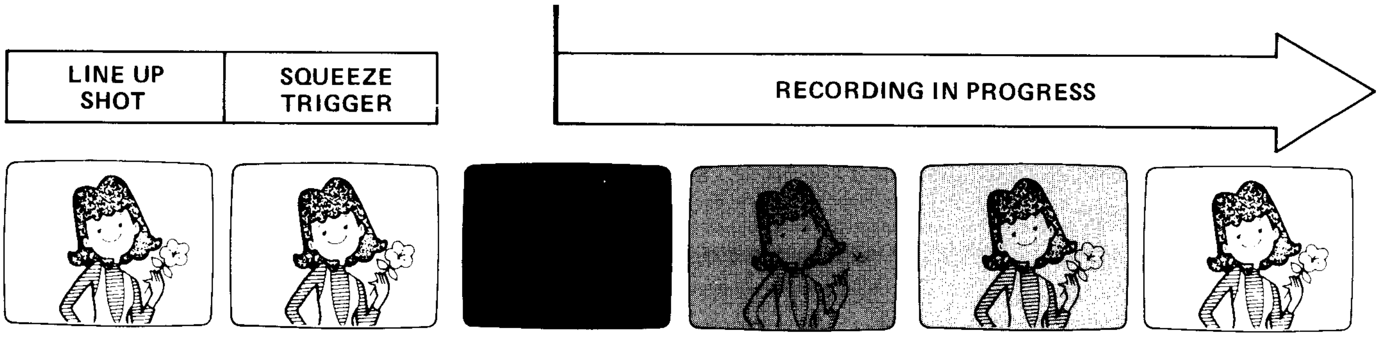
- **Fade IN/Fade OUT**

Professional looking tapes can be made by using the Fader Switch.

When the Fader Switch is ON:

1. The picture will "fade in" everytime the camera trigger is squeezed to start recording.
2. The picture will "fade out" everytime the camera trigger is squeezed to pause the recorder.

FADE IN


LINE UP SHOT
SQUEEZE TRIGGER
RECORDING IN PROGRESS
PICTURE FADES IN

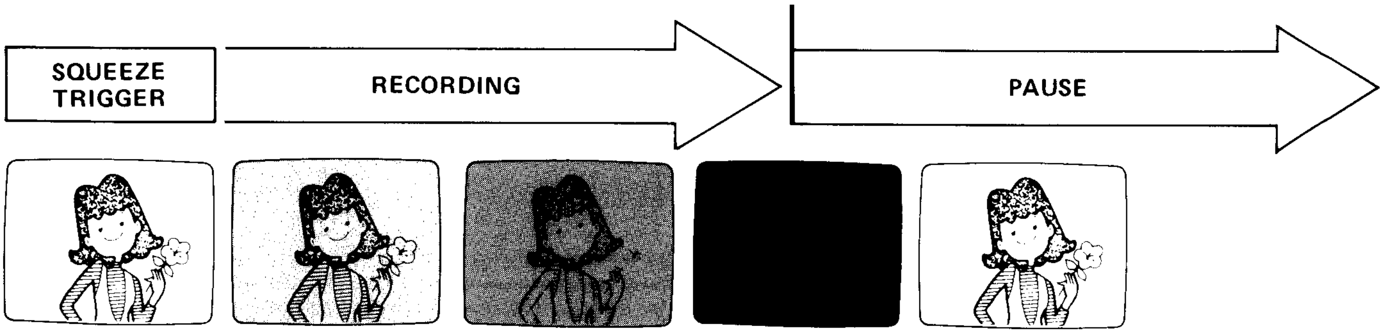
Viewfinder picture-for focus adjustment

Squeeze Trigger to record

Picture fully faded-tape starts rolling

With the fader switch on, the tape does not start rolling until the picture in the viewfinder is fully faded out. Then tape rolls as the picture fades in.

FADE OUT


SQUEEZE TRIGGER
RECORDING
PAUSE
PICTURE FADES OUT

Squeeze Trigger
To pause

Viewfinder comes back to line up next shot. Tape is paused.

With fader switch on, the recorder does not pause until the picture has fully faded out. After the recorder pauses, the viewfinder picture returns in order to line up the next shot.

• Color Temperature

Lighting conditions vary considerably from location to location. For instance, indoor lighting is "warm" (reddish) and outdoor lighting is "bright" (bluish). To be sure that white objects appear white, the camera has a color temperature control for coarse adjustment, and automatic white balance (AWC) for fine adjustment.

Using Color Temperature and AWC, the camera's red and blue gain are adjusted to compensate for the lighting.

• Automatic Iris Lens

The automaitc iris in the lens adjusts the amount of light reaching the pick-up tube. If the lighting is low, the iris opens. As the lighting increases the iris narrows. By placing the Iris Control switch in the "MANUAL" position – the iris can be adjusted manually.

• Light Intensity Indicator

If the lighting is very low, even though the iris opens there may not be enough light for proper camera operation. If the Light Intensity Indicator orange LED comes on, there is insufficient lighting – provide more illumination.

• Gain Boost

This AGC ON/OFF switch allows the gain of the camera to be increased for use in low light conditions. Set the AGC switch to "ON" if the orange LED stays on and extra lighting is not practical. In adequate lighting conditions it is preferable to set the switch to "OFF"

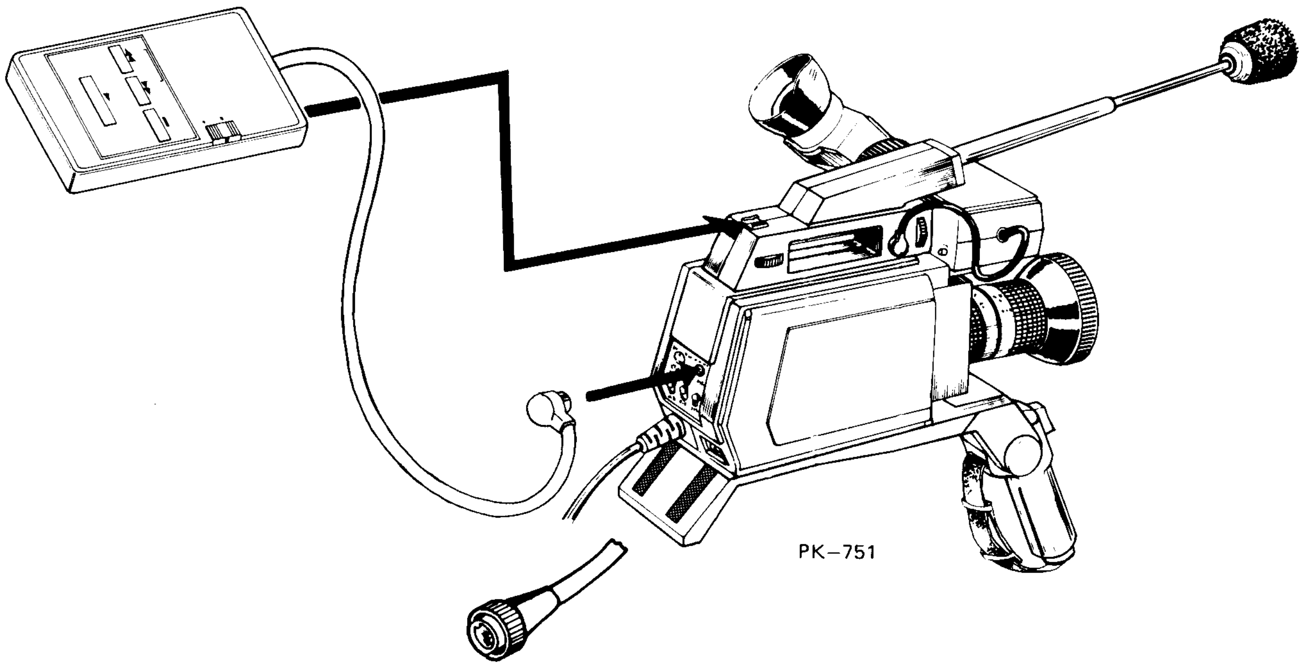
• Automatic White Balance

Because the color content of light changes from scene to scene, AWC adjustment should be performed when you change locations – or – even if you don't change locations and the sky becomes much more sunny or much more cloudy, AWC adjustment is indicated.

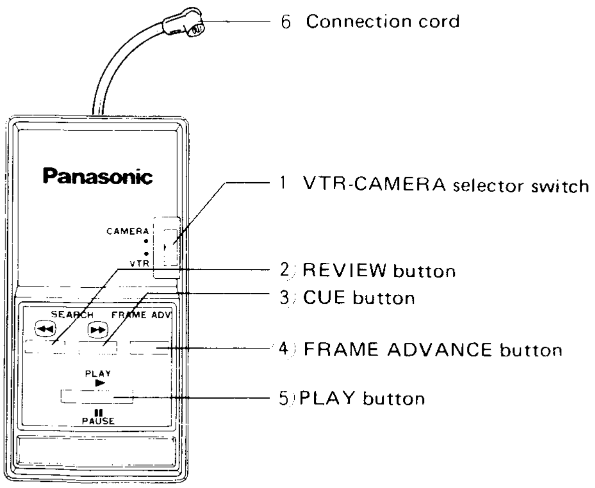
1. Be sure the camera power is ON.
2. Aim the camera at a white object (never at a light source). White lens cap may be placed on the lens if there is no white object. Be sure the intensity indicator (orange LED) is off.
3. Press the AWC button.
4. Wait for the AWC indicator to turn green.
5. You are ready to shoot.

USING THE REMOTE CONTROLLER (OPTIONAL)

If the PK–751 is used with a Panasonic PV–4000 series Portable Videotape Recorder, the Remote Controller can also be used. This allows control of the Cue and Review and some other functions of the recorder from the camera. Attach the Remote Controller to the accessory shoe, and connect the plug to the camera as shown.



CONTROLS AND THEIR FUNCTION


6 Connection cord
Panasonic
1 VTR-CAMERA selector switch
CAMERA
VTR
2 REVIEW button
3 CUE button
SEARCH
FRAME ADV
4 FRAME ADVANCE button
PLAY
5 PLAY button
PAUSE

① **VTR/CAMERA selector switch**

This switch determines if the recorder will either be recording or playing.

"CAMERA" position is for recording. "VTR" position is for playing back.

② **SEARCH REVERSE**

During playback, push this button continuously to obtain a reverse motion picture at 5 to 9 times of normal speed, (SLP recordings provide the best results).

③ **SEARCH FORWARD**

During playback, push this button continuoulsy to obtain a forward motion picture at 5 to 9 times of normal speed (SLP recordings provide the best results)

④ **FRAME ADVANCE**

Press and hold this button to advance frames forward.

⑤ **PLAY**

This button only works when the VTR/CAMERA selector switch is in the "VTR" position.

Press this button to release or engage the playback pause mode.

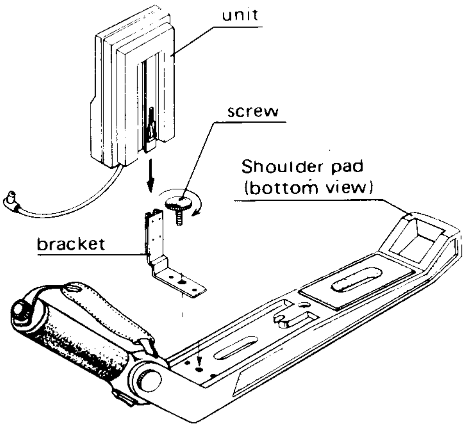
⑥ **CONNECTION CORD**

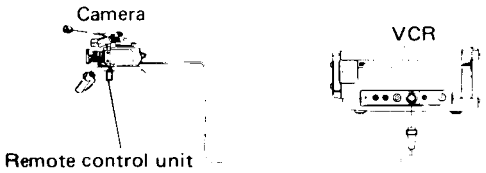
This connects to the rear of the camera.

CONNECTION

Connect the PK–R70 to the attachment bracket and then to the PK–701 or PK–801 or PK–751 or PK–771 as shown.

Then connect the plug to the rear of the camera.





OPERATION

1. Connect the PK–R70 to the camera as described on page 4. Connect the camera to the recorder. (Refer to the operating instruction of the camera you are using.)
2. Turn the recorder power "ON".
3. Set the recorder's CAMERA REMOTE switch "ON".

TO RECORD

1. Place the VTR/CAMERA switch in the "CAMERA" position.
2. Use the camera trigger to engage or release pause.

TO PLAYBACK

1. Place the VTR/CAMERA switch in the "VTR" position.
2. Use the PLAY button to engage or release pause.
3. Use search forward or reverse to locate a particular segment.
4. Use FRAME ADVANCE as desired.

TO STOP OPERATION

1. Set the camera remote switch of the recorder to "OFF".
2. Now, rewind or FF can be activated.

APPLICATION

If you are outdoors and wish to add a new section to a previously recorded tape—simply playback and use search to find the particular section. Then move the VTR/CAMERA switch to "CAMERA"–and squeeze the camera trigger to add on the new recording.

NOTES

- The CAMERA REMOTE switch on the recorder must be "ON", otherwise the PK–R70 will not operate.
- Recordings made in SLP provide the best looking SEARCH and STILL pictures.
- Switching the VTR/CAMERA selector automatically engages the pause mode–giving the user utmost control.
- The PK–R70 is for use with the PK–751, PK–801, PK–771, PK–701, and decks PV–4000 series only.
- If the safety tab of the cassette is missing, the remote control will not function.
- If the tape comes to its end while the remote control is in use – the recorder's power switch will automatically turn off. To rewind, see page 5.
- Avoid connecting the remote control to the camera while the power is on. This may cause the deck to misoperate.
- If a connector is plugged into the video input jack of the recorder while the remote control is in use, the recorder will stop. Subsequently, the remote control will not function.

TO PRODUCE THE BEST COLOR VIDEO PROGRAM

The PK-751 has been designed for normal scene illumination of 90 footcandles (900 lux.)
An illumination of 90 footcandles (900 lux) is standard, but the camera may be used at F1.6, if illumination is more than 8 footcandles (80 lux).

•Lighting

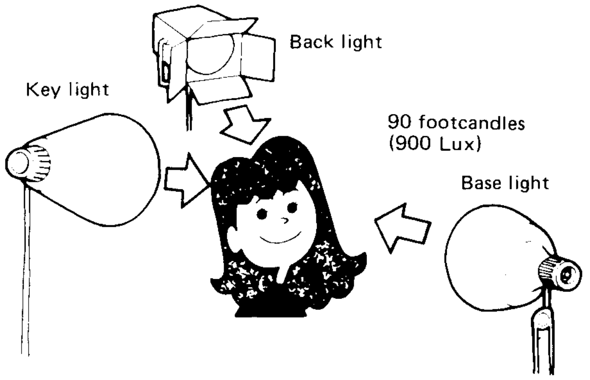
Indoor Lighting

- Object illumination: Approx. 90 footcandles (900 lux).
- Keep sufficient distance between the lights and the object to get uniform illumination.
- Maintain as much brightness as possible behind the object.
- Minimize object shadows.

These are the fundamentals for reducing the contrast ratio. To emphasize a three-dimensional effect or to add depth, use additional spot lights.

Front Light and Back Light

When using your camera outdoors, use it preferably with the sun behind you. Using your camera with the sun in front of you not only makes for difficult aperture ring adjustment, but creates a video signal with too much contrast and subdued color. If possible, zoom in on your object to fill the screen. Following these simple steps assures that your camera will produce natural color programs.

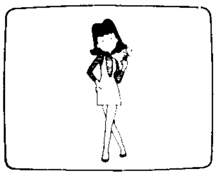


POINTERS ON HOW TO USE THE CAMERA

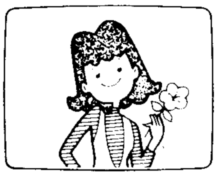
1. Recording close up shots

It is recommended for various pictures that the lens is zoomed-in or zoomed-out to make an object appear larger or smaller. The camera may be operated fully zoomed-in, zoomed-out or in between for the desired result.

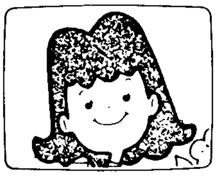
- fullshot



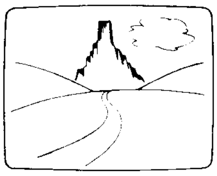
- bustshot



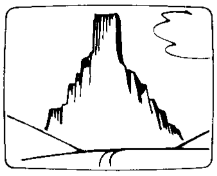
- close up



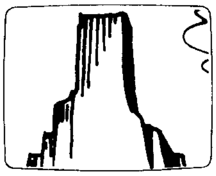
- long



- medium



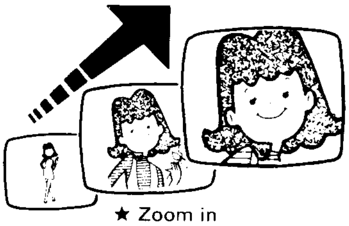
- close up



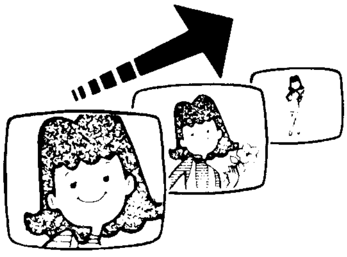
2. Zooming

Zoom in . . . . . The picture gets larger.
Zoom out . . . . The picture gets smaller.

- Focus should be adjusted when in the zoomed-in (telephoto) position. Focus should then track over the entire zoom range. When the camera is aimed at a new scene or object, refocusing will be required.
- Zooming-in is useful when you wish to get a closer view of the picture being recorded.



★ Zoom in

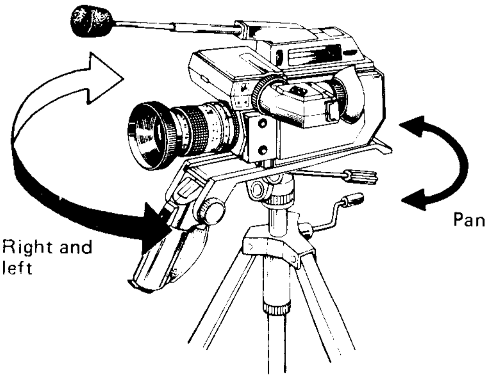


★ Zoom out

3. Pan and Tilt

Pan . . . . . . Shooting right and left
Tilt . . . . . . Shooting up and down

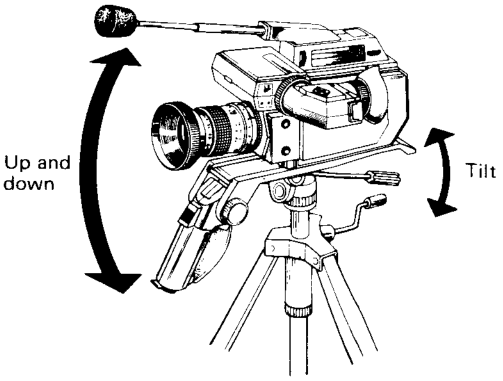
- Pan and Tilt is useful when shooting an object as illustrated.
- Be sure to move the camera slowly to prevent the picture from moving too fast.
- Make certain that the picture is in focus during Pan and Tilt operation.



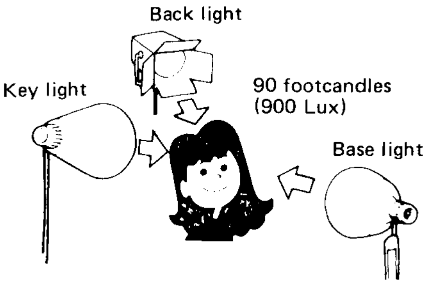
4. Focus

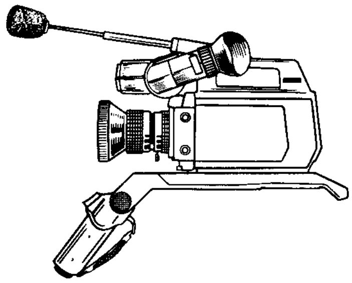
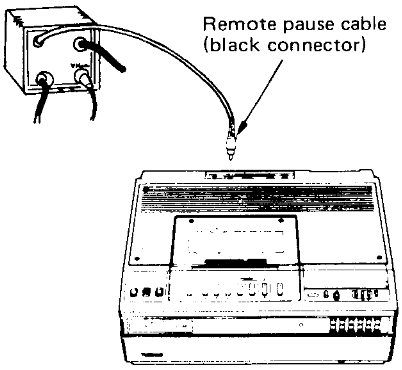
These are shooting techniques to focus an object by rotating the focus ring on the lens. Be sure to install the camera securely;

Focus out . . . . An object changes out of focus gradually.
Focus in . . . . . An object becomes in focus gradually.
Focus shift . . . The focus point is shifted backward and forward.

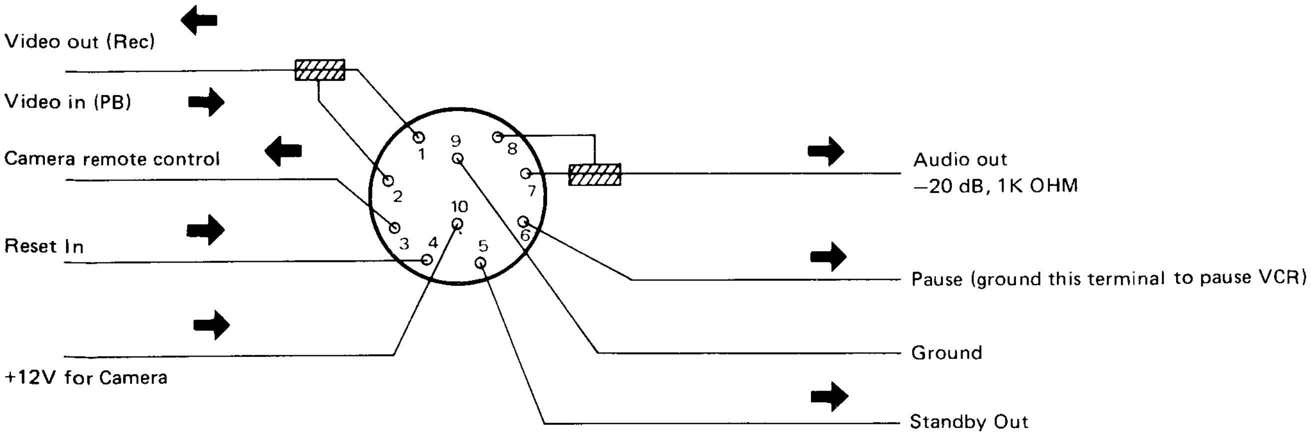


BEFORE REQUESTING SERVICE

Condition	Main Cause and Remedy
No picture	●Check if the Power Supply is plugged in (in case the Power Supply is being used). ● Check if the VCR power switch is on – and the battery is charged. ●Check if all necessary cables are connected correctly. ●Check if the lens cap is on. ●Check if the Standby switch is set to the "Operate" position.
Color Balance not proper	●Check if the lighting is adequate. ●Check the color temperature correction switch for proper setting. ●AWC may need to be readjusted.
Color rendition not proper	●Check if the color TV is adjusted properly. ●Check if the lighting is adequate. Insufficient lighting can considerably alter color rendition.  Back light Key light 90 footcandles (900 Lux) Base light
Viewfinder picture is upside down	●Turn camera power off. Then place the picture turning switch in the proper position.
VCR does not pause immediately when the trigger is squeezed.	●This is normal if the Fader switch is on.
Picture seems very grainy	●AGC switch should be in the "OFF" position for normal shooting.

Condition	Main Cause and Remedy
Focus is not sharp	●Check if the surface of the lens is dirty or dusty. ●Check if the lens is properly focused. 
Color for indoor or outdoor is not correct	●Check if the color temperature correction switch is properly set. ●Color control knob may need to be adjusted.
Recording does not operate	■When the Remote control is used, ●Check if the remote pause cable is correctly connected. (in case a home video recorder is used) ●Check if the camera cable is properly connected to the portable VCR.  Remote pause cable (black connector)

10 Pin Camera Connector Diagram


Video out (Rec)
Video in (PB)
Camera remote control
Reset In
+12V for Camera
1
2
3
4
5
6
7
8
9
10
Audio out
−20 dB, 1K OHM
Pause (ground this terminal to pause VCR)
Ground
Standby Out

ABBREVIATIONS USED IN THIS MANUAL

ADJ : Adjustment

Adj. : Adjustment

AFC : Automatic Frequency Control

AGC : Automatic Gain Control

AMP. : Amplifier

AWC : Automatic white Balance Control

B : Blue

BAL Balance

B.F.P. : Burst Flag Pulse

BLK : Blanking

BPF : Band Pass Filter

BSC : Blue Sub Carrier

C : Close

CB : Composite Blanking

CBA : Circuit Board Assembly.

CP-1 : Clamping Pulse 1

CP-2 ; Clamping Pulse 2

CRT : Cathode Ray Tube

CS : Composite Sync

DEF : Deflection

DET : Detector

DIFF AMP : Differential Amplifier

DL : Delay Line

DY : Deflection Yoke

ELIM : Elimination

EVF : Electronic View Finder

FBT : Fly Back Transformer

FET : Field Effect Transistor

FH : 15.75 KHz Horizontal Drive Pulse Frequency

G : Green

GB : Gated Burst Signal

GEN : Generator

H : Horizontal

HCC : High Chrominance Clip

HD : Horizontal Drive Pulse

Hd : Horizontal Drive Pulse (Delayed HD)

HP : Horizontal Parabola Waveform

Hs : Horizontal Saw-tooth Waveform

HSS : Horizontal Scanning Start Pulse

LCC : Low Chrominance Clip

LIN : Linearity

LPF : Low Pass Filter

LVL : Level

MOD : Modulation

OB : Optical Black

OSC : Osillator

OVF : Optical View Finder

PCB : Printed Circuit Board

PED : Pedestal

R : Red

REMO. CON. : Remote Control

RSC : Red Sub Carrier

SC1 : 0° Phase Sub Carrier

SC2 : 90° Phase Sub Carrier

SD : Shading Correction

SEPA. : Separation

TEMP. : Temperature

V : Vertical

VD : Vertical Drive Pulse

VP : Vertical Parabola Waveform

VS : Vertical Saw-tooth Waveform

VSS : Vertical Scanning Start Pulse

WBLK : Wide Blanking Pulse

YE : Edge Correction Input Signal

YH : Luminance Signal

YL : Low Band Luminance Signal

GENERAL DESCRIPTION

(1) VIDICON

Vidicons are extensively used in closed-circuit TV cameras because of their small size, simplicity and ruggedness. All vidicons make use of the same basic principles. This camera uses a new electrostatic focus, magnetic deflection 2/3" vidicon with an integral stripe filter. A conventional magnetic focus, magnetic deflection vidicon has an external focus coil (wound inside the deflection coil assembly) through which a DC current flows, forming an electron lens inside the vidicon to focus the electron beam on the target. The electrostatic focus, magnetic deflection vidicon has extra electrodes (G3, G4, G5) inside the vidicon as shown in Fig. 1 to focus the electron beam on the target. Total power consumption of the camera is reduced by eliminating the power that would have been required for the focus coil, and the power required for deflection is also reduced. The electron beam emitted by the cathode is accelerated by the G2 electrode and passed through a beam limiting aperture (Fig. 1) to form a small diameter electron beam. The electron beam is then focused by the electrostatic lens formed by electrode G3-G4-G5, as shown in Fig. 2. This electrostatic lens replaces the focus coil and focus circuit. Electrodes G5-G6 form an independent "collimating lens" that bends the beam so that the landing angle of the electron beam is always perpendicular to the target for good corner resolution. The deflection assembly includes the beam alignment magnets (Fig. 2) which provide an auxiliary magnetic field to center the electron beam in the tube. Since the effective diameter of the focus lens is small, misadjustment of the beam alignment magnets results in poor resolution and color shading. Camera alignment therefore requires careful adjustment of the beam alignment magnets.

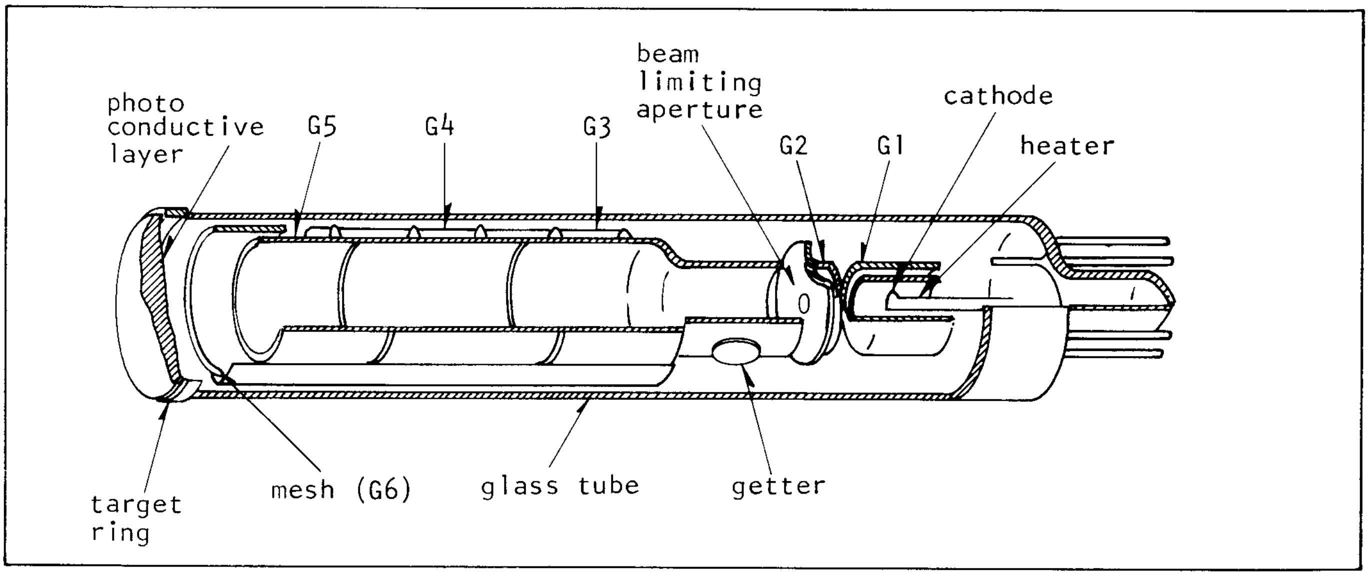
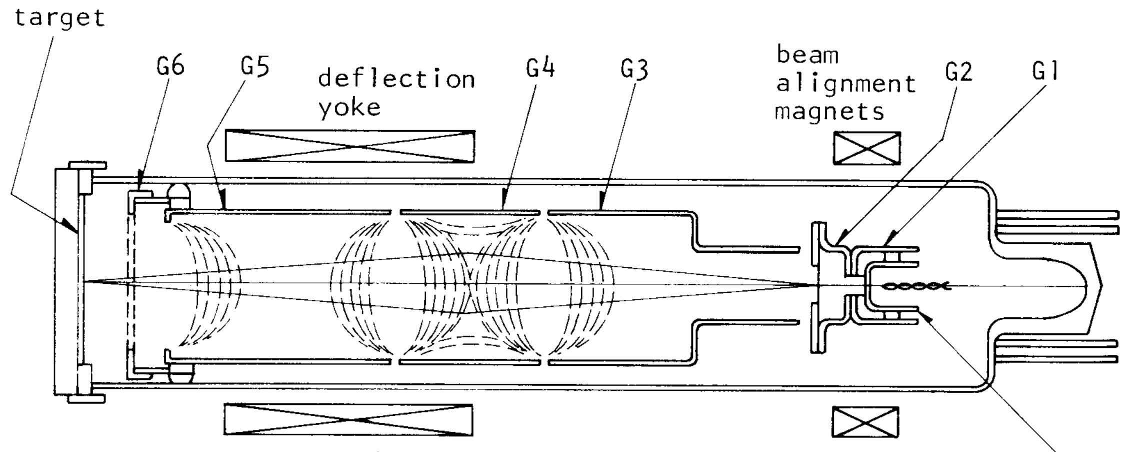


photo conductive layer
G5
G4
G3
beam limiting aperture
G2
G1
cathode
heater
target ring
mesh (G6)
glass tube
getter

Fig. 1. Construction details of the vidicon


target
G6
G5
deflection yoke
G4
G3
beam alignment magnets
G2
G1
K

G1(BEAM)	0～-100V
G2	350V
G3,G6(MESH)	1600V
G4	230V (Variable:200～250V)
G5	800V

Fig. 2. Electrostatic focus lens and electrode details

(2) GAMMA

As light falls on the target, the signal output increases, but not at a linear rate. The relationship of light input to output signal is referred to as the gamma (γ) or transfer characteristic. Vidicons have a gamma of about 0.7 or 0.65. The cathode ray picture tube has a transfer characteristic of its own, which is 2.2. To get a transfer of light change that is unity, the camera must use an electronic circuit to achieve a gamma of 0.45, the reciprocate of 2.2. ($2.2 \times 0.45 \doteqdot 1$) This is called gamma correction.

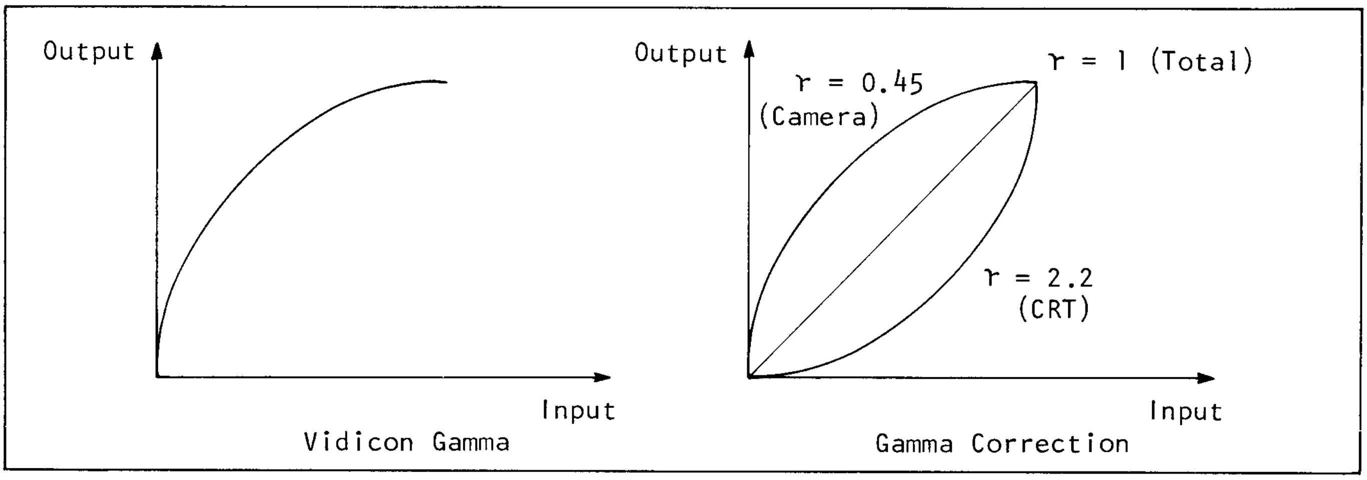


Fig. 3.

(3) STRIPE FILTER

The operation of the stripe filter on the faceplate of the vidicon depends on several facts which bear review. The composition of what is perceived as white light is a mixture of many wavelengths, which we can group by wavelength or color as shown in Fig. 4-(A).

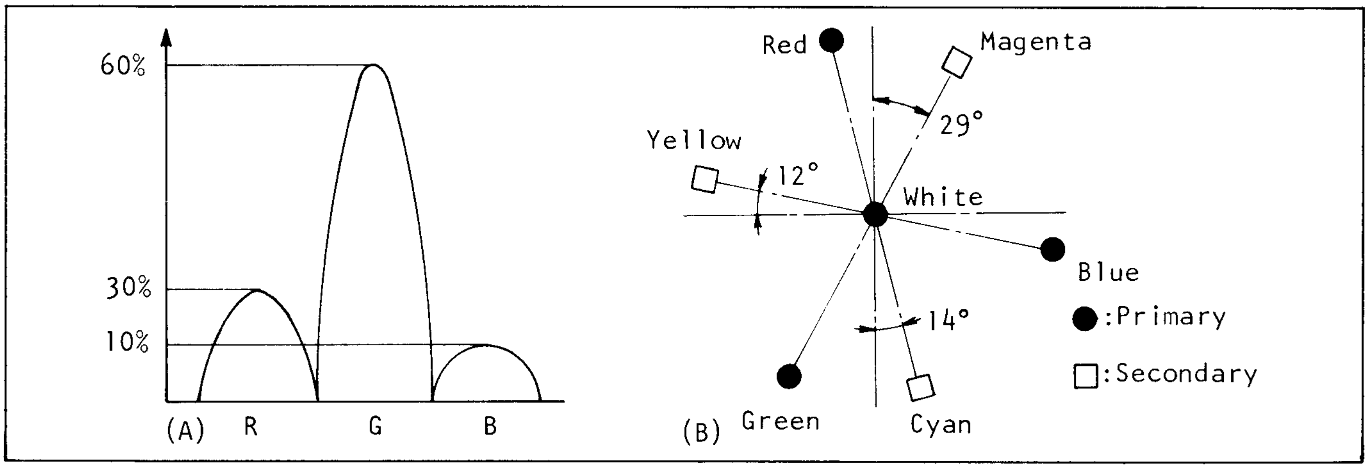


Fig. 4. Amplitude and Phase Relations Among R,G and B.

Further, while it may be apparent that all the wavelengths or colors will pass through a transparent filter, one must think of the operation of a filter of complimentary color. If a tricolor system of colorimetry is considered (Fig. 4-(B)), any two primary colors may mix to form a different secondary color which is not one of the original three primary colors but the exact opposite of the unused primary color. White light passed through a filter of this new, secondary color will contain both of the original colors but none of the complementary color. See Fig. 4, and imagine a filter of yellow, a color which is made from Red and Green.

Should white light be passed through this yellow filter, Red, Green and some of the Magenta and Cyan light will pass. But the blue light will not pass. Similarly, if a cyan filter were used, all but Red would pass. Lastly, the use of a color filter will of course allow the passage of image details--the shape, outline and reflectance of the objects seen by a lens, for example--if an image were used in place of the hypothetical white light described above.

These details form basics for the stripe filter Vidicon:

1. The color of any object can be carried by the information in three primary colors.
2. When red, blue and green are used as the primary colors, 60% of the visual information and light energy is green. (Fig. 6 A)
3. A cyan filter will pass green and blue (but not red) (Fig. 5-2) and a yellow filter will pass green and red (But not blue) (Fig. 5-2). Now lets discuss the color portion of the Vidicon, a thin film filter such as that depicted below is placed on the faceplate, both the filter stripes and the image from the camera lens will be in focus without the use of additional lenses.

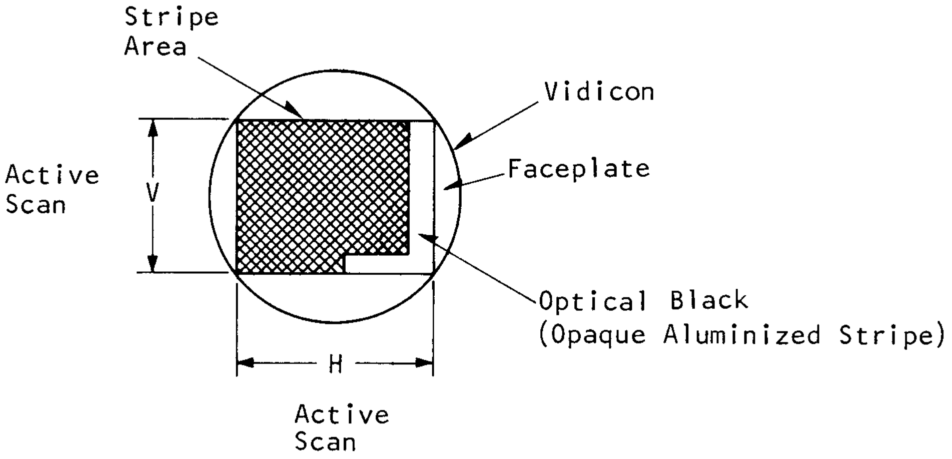


Fig. 5-1. Vidicon Faceplate

With careful design of stripe angle, size and active scan area, horizontal and vertical, the conditions described in Fig. 6 can be obtained.

COLOR STRIPE FILTER	COLOR PASSED
Transparent (Clear)	Red, Blue and Green
Cyan	Blue and Green
Yellow	Red and Green
Cyan and Yellow	Green

Fig. 5-2.

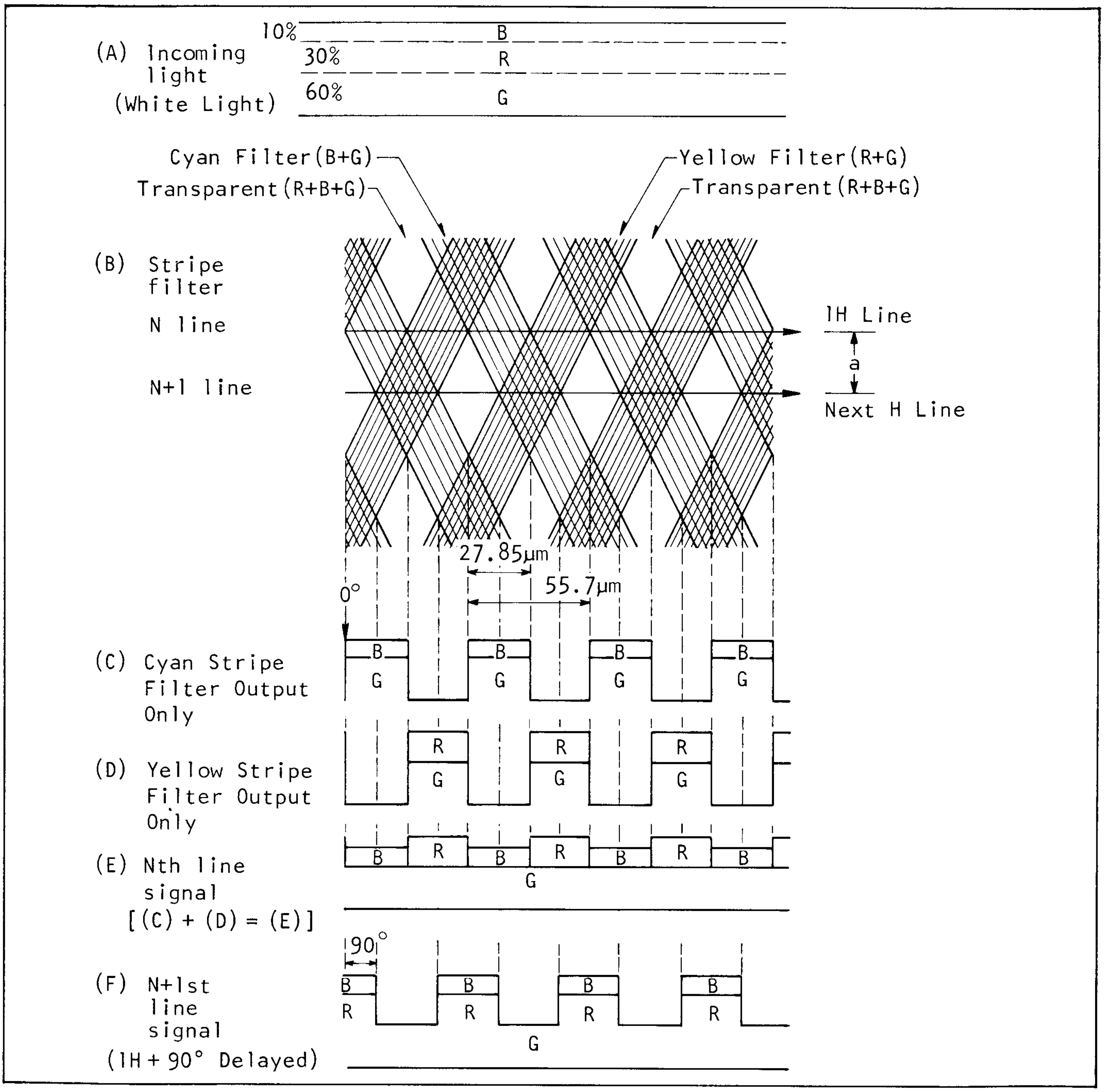

(A) Incoming light (White Light)
10%
B
30%
R
60%
G
Cyan Filter(B+G)
Transparent(R+B+G)
Yellow Filter(R+G)
Transparent(R+B+G)
(B) Stripe filter
N line
N+1 line
1H Line
a
Next H Line
27.85μm
55.7μm
0°
(C) Cyan Stripe Filter Output Only
B
G
(D) Yellow Stripe Filter Output Only
R
G
(E) Nth line signal [(C) + (D) = (E)]
B
R
G
90°
(F) N+1st line signal (1H + 90° Delayed)
B
R
G

Fig. 6. Signal from Vidicon

The tube alignment and rotation will assure that horizontal scan exactly bisects the angel formed by the stripes, and vertical scan will determine that each horizontal scan will fall as shown Fig. 6 B. Further, the width of each stripe and the horizontal scan width will determine the characteristic frequency of the process, in this case it will be 3.58MHz. As light falls on the stripes, the contrast pattern formed by stripe/no stripe/stripe will optically generates an R.F. carrier above the fundamental luminance information (picture detail). This carrier rides above the luminance.

As shown in Fig. 6. B, the integral stripe filter consists of a cyan/transparent stripe filter section and a yellow/transparent stripe filter section.
These stripe filters are so arranged as to be of the same pitch in the horizontal scanning direction, and equal angle in the vertical direction. The vidicon's even and odd scanning lines pass the elements of the stripe filters that are arranged in a fixed pattern. Lets assume that a white light of uniform level containing proportioned green (G), red (R) and blue (B) reaches the vidicon (Fig. 6. A), and the cyan and yellow stripe filter is scanned as shown in Fig. 6. B. The cyan filter cuts off the R. light which is complimentary to it (Fig. 6. C), and the yellow filter cuts off the B. Light which is complimentary to it (Fig. 6. D). At the N scanning line the signal E contains the modulated R. and B. signals, and G. signal. At the next horizontal scanning line N + 1, the signal F also contains the modulated R. and B. signals and G. signal. The stripe filters have the same pitch in the horizontal scanning direction, and the same angle in the vertical directions so that there is a carrier phase difference of 90° between the N line and the N + 1 line modulated signals. This modulation frequency for the R. and B. signals can be calculated from stripe width, pitch and scan width and velocity and in this case its 3.58MHz.

The incoming light is thus converted by the integrated stripe filter into a signal which contains R. and B. signals modulated by 3.58 MHz. This signal is sent to the pre-amplifier, where it is amplified (Fig. 7 G). The amplified signal G from the pre-amplifier is sent to a low pass filter circuit, which passes only the luminance (YH) signal Fig. 7 H making up the G. signal. The amplified signal G is also supplied to the band-pass filter (BPF) whose center frequency is 3.58 MHz, through which only the modulated signal I passes.
The modulated signal I is sent to the 90° phase shift circuit and the 1H (1 line) delay circuit, from which 90° phase shifted and 1H-delayed, modulated signals J and K are obtained. The modulated R. (Rc) signal (L) is obtained by adding the modulated signals (J) and (K), and a modulated B. (Bc) signal (N) is obtained by subtraction of the modulated signals (J) and (K). The Rc and Bc signals obtained by addition and subtraction are supplied to detectors, from which R. signal (M) and (B) signal (O) are obtained.

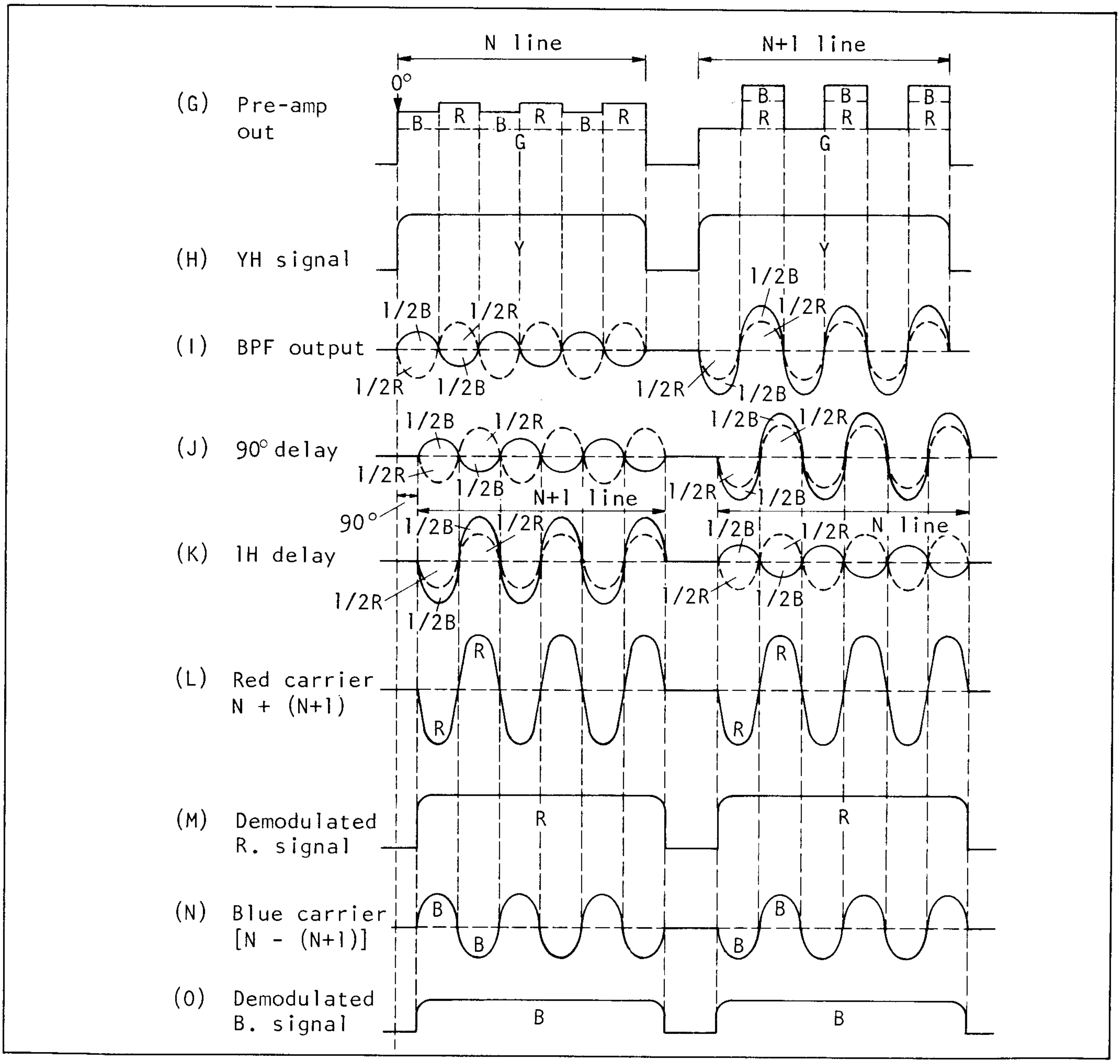

N line
N+1 line
0°
(G) Pre-amp out
B
R
G
(H) YH signal
Y
(I) BPF output
1/2B
1/2R
(J) 90° delay
90°
(K) 1H delay
N+1 line
N line
(L) Red carrier N + (N+1)
R
(M) Demodulated R. signal
(N) Blue carrier [N - (N+1)]
(O) Demodulated B. signal

Fig. 7-A. Detection of Y,R and B. signals

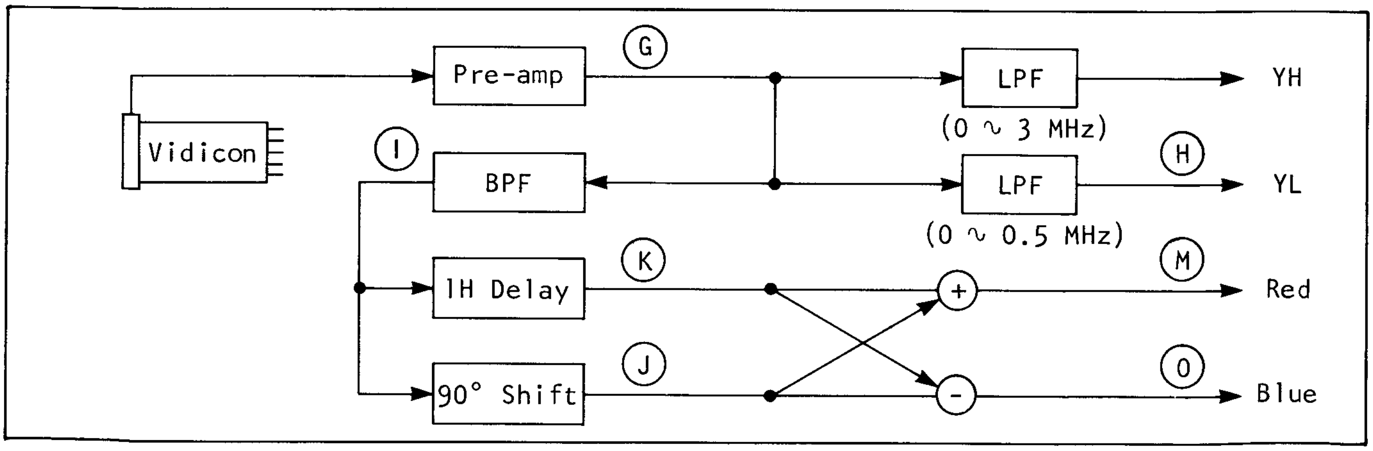

Vidicon
Pre-amp
G
LPF
(0 ∿ 3 MHz)
YH
I
BPF
LPF
(0 ∿ 0.5 MHz)
H
YL
1H Delay
K
+
M
Red
90° Shift
J
-
O
Blue

Fig. 7-B.

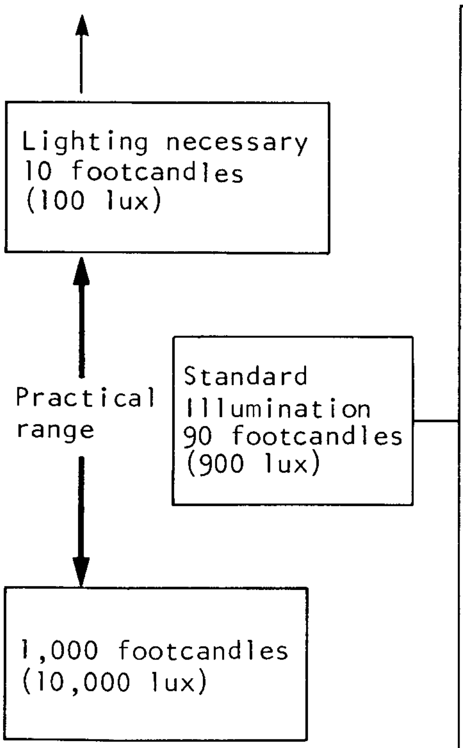
(4) CORRECTION CIRCUITS

A. Color Temperature Correction

There are two main aspects we have to consider when we think of light. The first is the brightness or intensity (Fig. 8) and the second is the color temperature.

Rough Values of Brightness

The figures in this table are approximate values for reference.


Lighting necessary
10 footcandles
(100 lux)
Practical range
Standard Illumination
90 footcandles
(900 lux)
1,000 footcandles
(10,000 lux)

[foot-candle]	[lux]	[Place or Daylight]
10	100	
	100∿200	Commercial stairways
	200∿300	Indoor golf range
	400∿500	Office with fluorescent lamps
	500∿700	Department store counter
	700∿800	Assembly line
100	1,000	
	1,000	Sunlight one hour before sunset, clear day
	1,000	Window side of an office with fluorescent lamps
	2,000	Sunlight one hour after sunrise on a cloudy day.
1,000	10,000	
	25,000	Sunlight at 10AM, cloudy day
	32,000	Sunlight at noon, cloudy day
	35,000	Sunlight at 3PM, clear day
	65,000	Sunlight at 10AM, clear day
10,000	100,000	Sunlight at noon, clear day

Fig. 8.

Light is made up of a spectrum of frequencies or colors. Violet being the lowest frequency and red being the highest (Fig. 9).

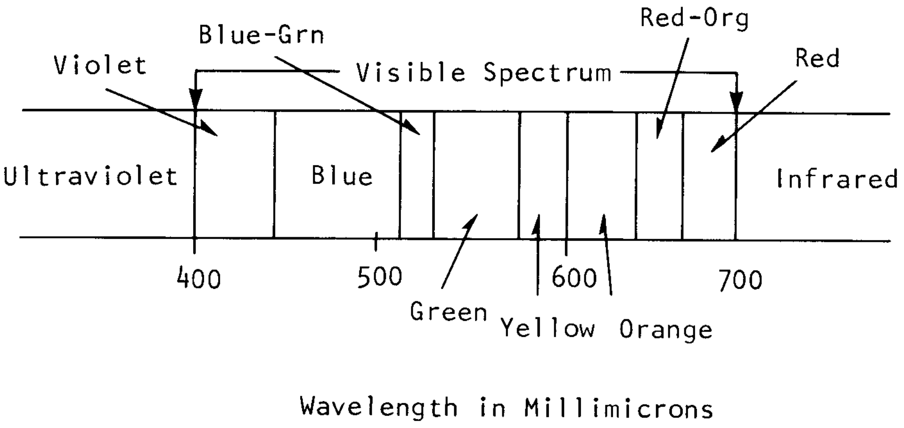

Violet
Blue-Grn
Visible Spectrum
Red-Org
Red
Ultraviolet
Blue
Infrared
400
500
600
700
Green
Yellow
Orange
Wavelength in Millimicrons

Fig. 9.

The human eye has a unique adaptability to perceive color correctly even when the light source is changed (when color temperature varies) from pure white to red-white or blue-white. However, machines do not have such adaptability, and "see" even the slightest change.

The color mix of what we perceive as white light (Fig. 10) will change

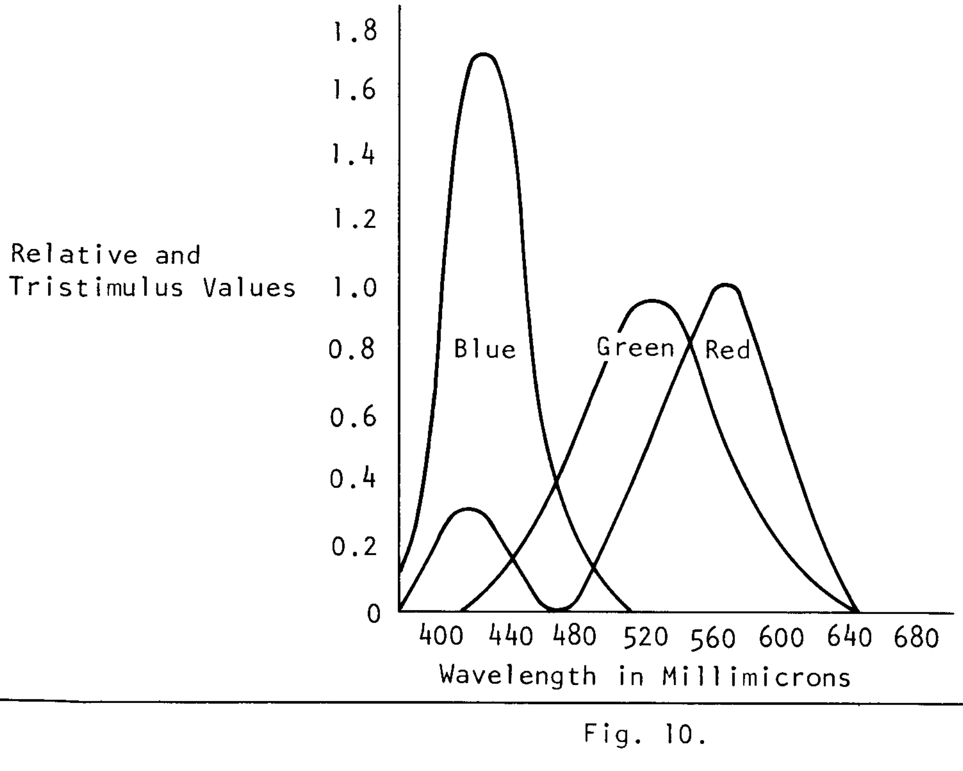


Fig. 10.

as we move from indoor artificial light to sunlight, objects illuminated by these different lights will change the proportions of the red and blue signals and the cameras output will appear to be miscolored. Cameras are normally adjusted to 3200° Kelvin Temperature (Fig. 11).

Light Source		Color Correction Switch	Color Temperature
Studio lighting such as Halogen lamp and tungsten lamp		💡	3200°K
Room light	Incandescent Lamp	💡	4500°K
	Fluorescent	▭	5000°K
Outdoor scene (sunny or overcast)		☁ ☼	5500°K

Fig. 11.

It is this reason that we have a automatic white balance control switch and color control knob mounted on the back of the camera. With these controls we can change the proportions of the red and blue signal so we can achieve a better white balance. At 3200°K we have a more reddish picture, so less gain is required in the red channel and more in the blue channel. At 5000°K or 5500°K, we have a more blueish picture and less blue gain is needed and more red.

B. V Edge Color Error Correction

As described, the Rc and Bc signals are separated from each other by addition and subtraction of the Rc/Bc signal delayed one horizontal line and the Rc/Bc signal not delayed.

When the camera views a dark to bright, or bright to dark transition as shown in Fig. 12, the Rc/Bc signal which is not delayed appears as in Fig. 12 (C), and the Rc/Bc signal delayed one line (1H) appears as in (D). When we make the transition of dark to bright the Rc/Bc (C) and (D) signals are not of equal level on the N + 1 line and a error signal (green) is caused along the vertical edge of the transition.

So it is necessary for us to supply a positive vertical (V) edge correction signal (E) to control the level of N + 1 line (F). This provides vertical correlation between Rc/Bc signals delayed and not delayed ((C) and (F)) prior to color separation. If the transition is from bright to dark, the error signal will be magenta and a negative V: correction signal will be used.

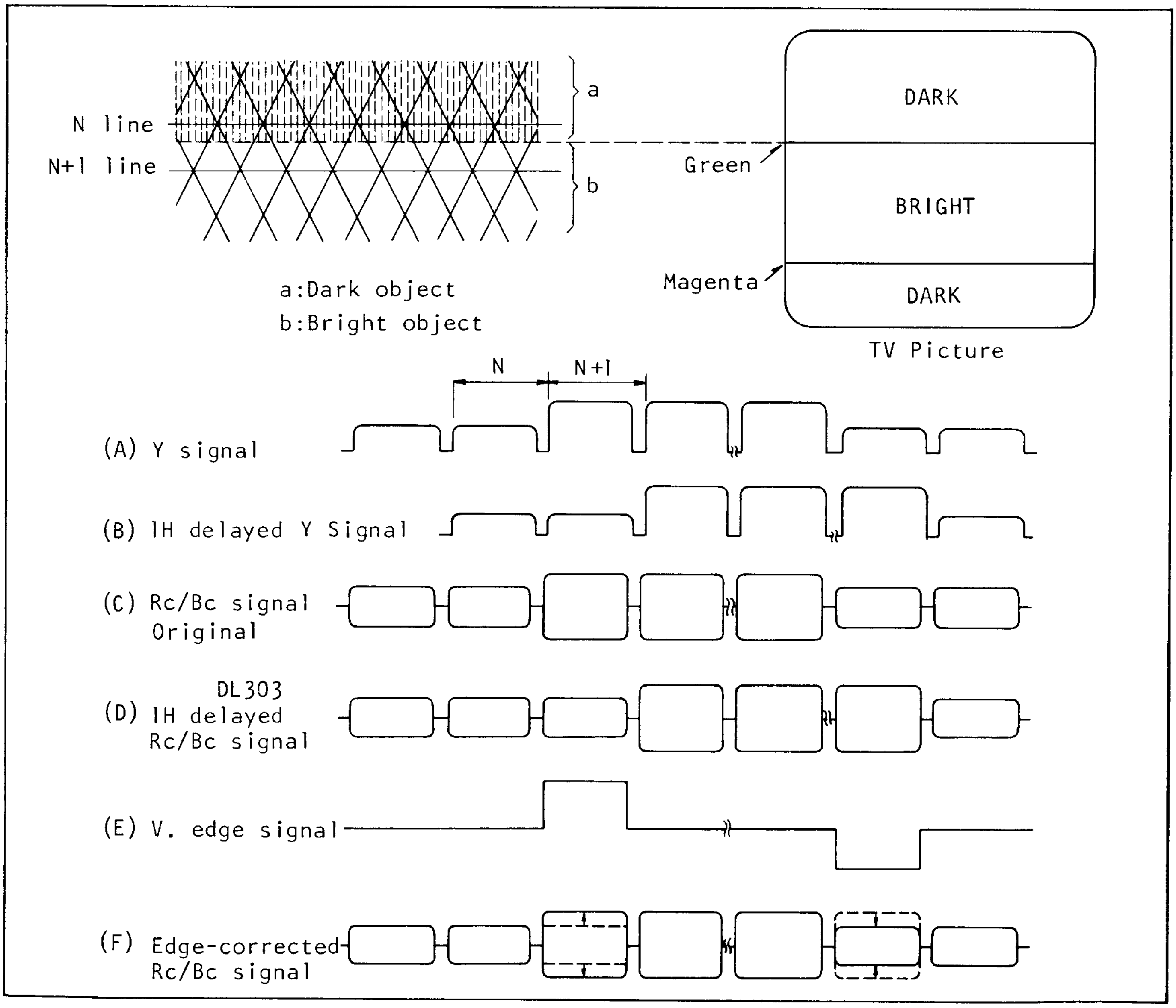

N line
N+1 line
a
b
a:Dark object
b:Bright object
DARK
Green
BRIGHT
Magenta
DARK
TV Picture
N
N+1
(A) Y signal
(B) 1H delayed Y Signal
(C) Rc/Bc signal Original
DL303
(D) 1H delayed Rc/Bc signal
(E) V. edge signal
(F) Edge-corrected Rc/Bc signal

Fig. 12. Color Correction

C. Color Shading Correction

Often the photo conductive layer on the surface of the vidicon is uneven. Therefore it's necessary to correct for this uneveness electrically.

Suppose a uniformly illuminated white object is seen by the camera and the R color component signal has a shading (error) such as that shown in Fig. 13. (A). In this case, a shading correction signal (B) is generated by the shading correction circuit (which is set to the proper level during alignment). The R signal (A) is modulated by the shading correction signal (B), and a corrected R signal (C) is produced. This shading correction signal is mixed with the R signal (C) by a differential amplifier, and the R signal (D) is obtained. The color shading correction of the B signal is similar.

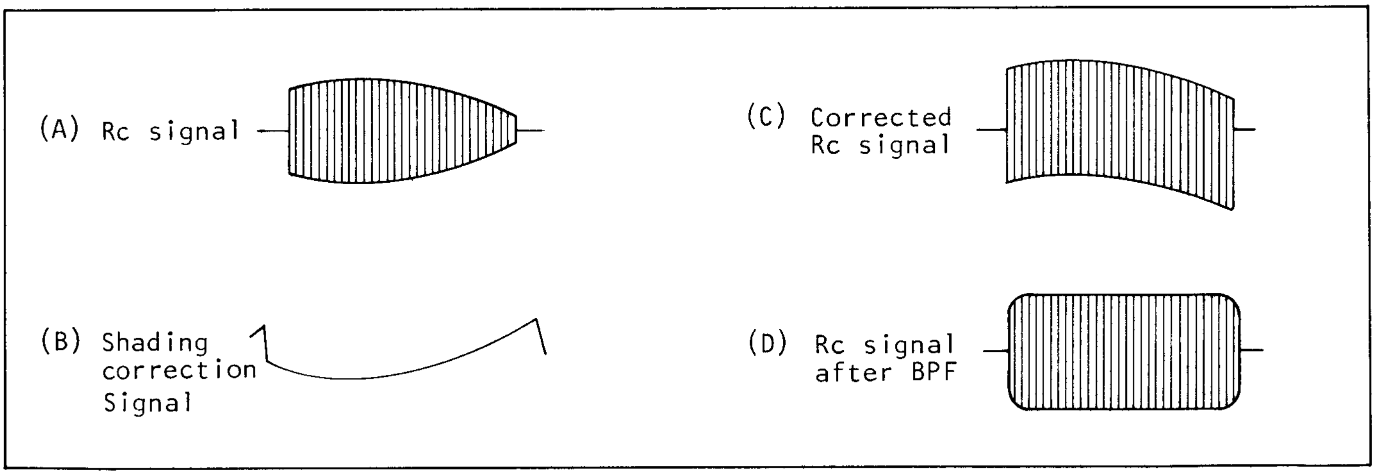


Fig. 13. Shading Correction

These correction waveforms are horizontal rate sawtooth and parabola. The two signals are formed from the horizontal deflection drive and injected in just the correct amount to get an over all flat color waveform.

D. Degamma Correction Circuit

As described before,the vidicon does not have linear photoelectric conversion characteristics. A typical vidicon gamma characteristics is shown in Fig. 14 (A). Becuase of this inherent characteristic, the higher levels of video signal will be compressed see Fig. 14 (B).

Since in this color camera the vidicon produces a 3.58 MHz modulated red (R) and blue (B) signals, mixed with a green (G) signal [see Fig. 15 (A)], the high levels of the modulated R and B. signals obtained by separating the mixed signals are also compressed (B).

The degamma correction signal circuit generates a degamma correction signal (D) to compensate for the compression of the high levels of the R and B. signals. This correction signal will be applied to both the Rc and Bc circuits as needed.

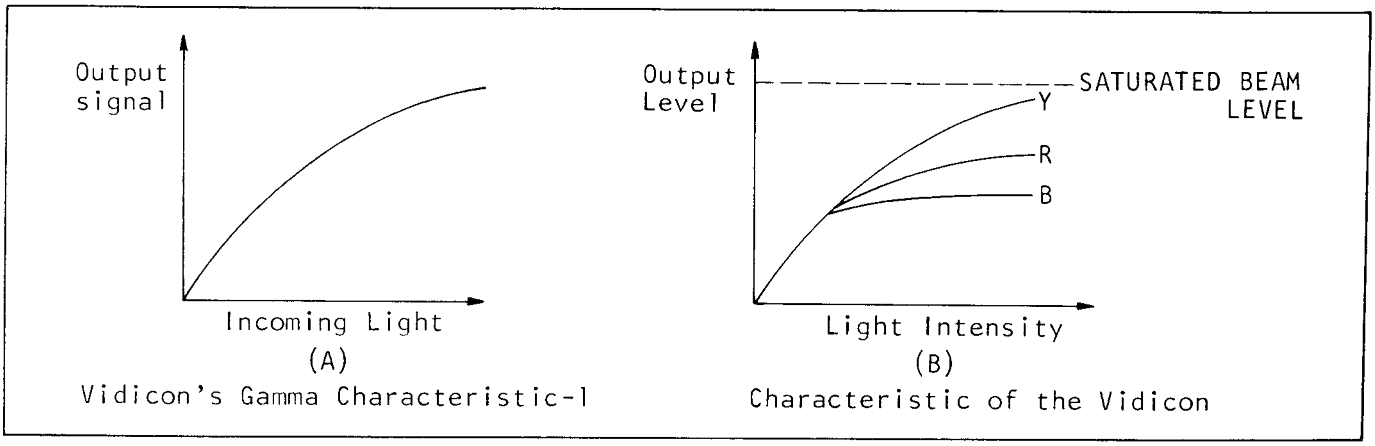


Fig. 14.

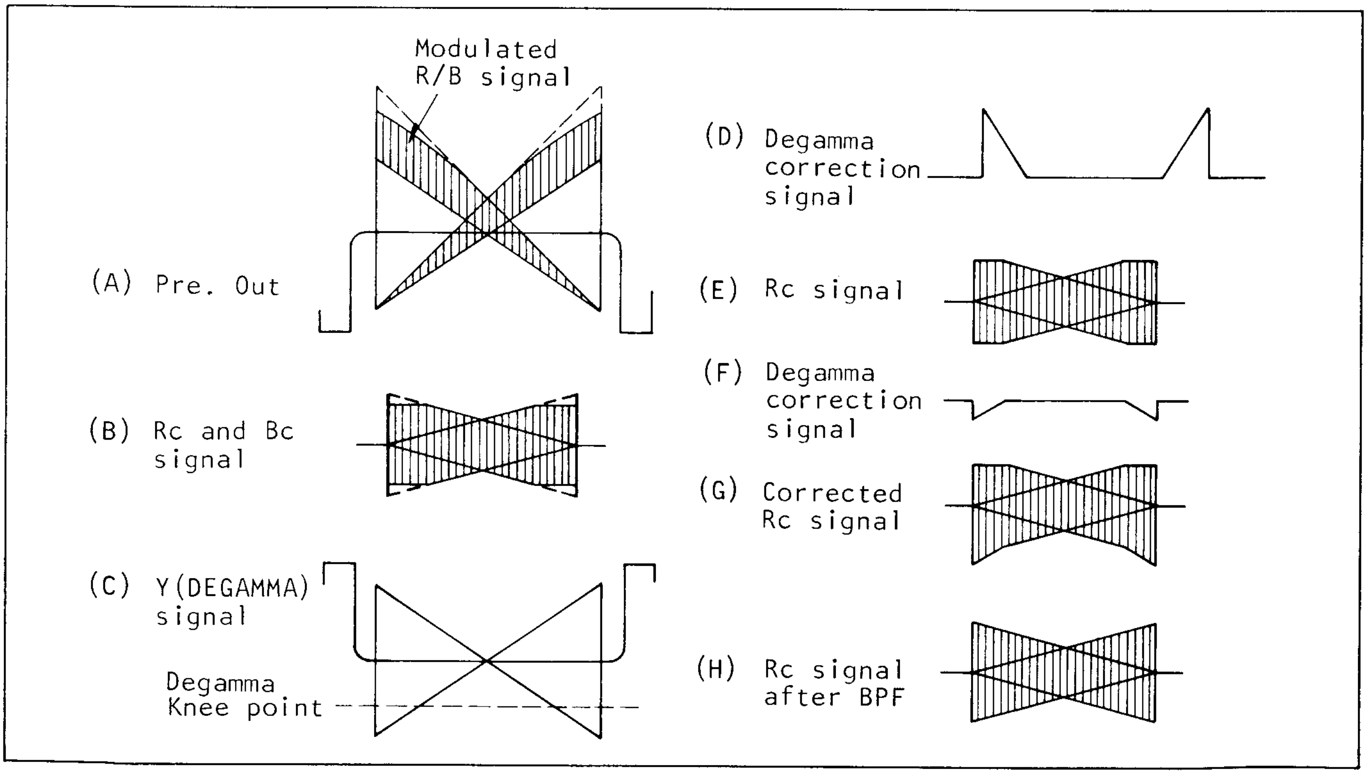

Modulated R/B signal
(A) Pre. Out
(B) Rc and Bc signal
(C) Y(DEGAMMA) signal
Degamma Knee point
(D) Degamma correction signal
(E) Rc signal
(F) Degamma correction signal
(G) Corrected Rc signal
(H) Rc signal after BPF

Fig. 15. Degamma Correction Signal

E. Optical Black clamp

The vidicon's output current corresponds to the incoming light intensity,but even when no light reaches the target, an output current called dark current is obtained. The dark current of the vidicon is relatively large and varies with the temperature of the vidicon. In a TV camera using a vidicon, the black level of the output signal is extremely unstable with respect to changing temperature. In a color camera using the signal carrier frequency multiplex system, the red (R) and blue (B) signals modulated at 3.58MHz ride on top of the luminance signal. Thus the black level of the R and B. signals are free of variations because they are independent of vidicon dark current. However, the black level of the Y signal does suffer adversely with respect to the dark current, which increases or decreases according to temperature variations. Therefore, the black level balance is imperfect due to a temperature difference, and this causes a change in color reproduction.

A metallic strip (optical black) (Fig. 16) for cutting off the incoming light at the end of the horizontal scanning is built into the vidicon. When the beam scans the optical black portion, the dark current of the vidicon is sampled and this signal portion is clamped to a fixed DC potential, so that the black level variations due to a change in dark current are tracked.

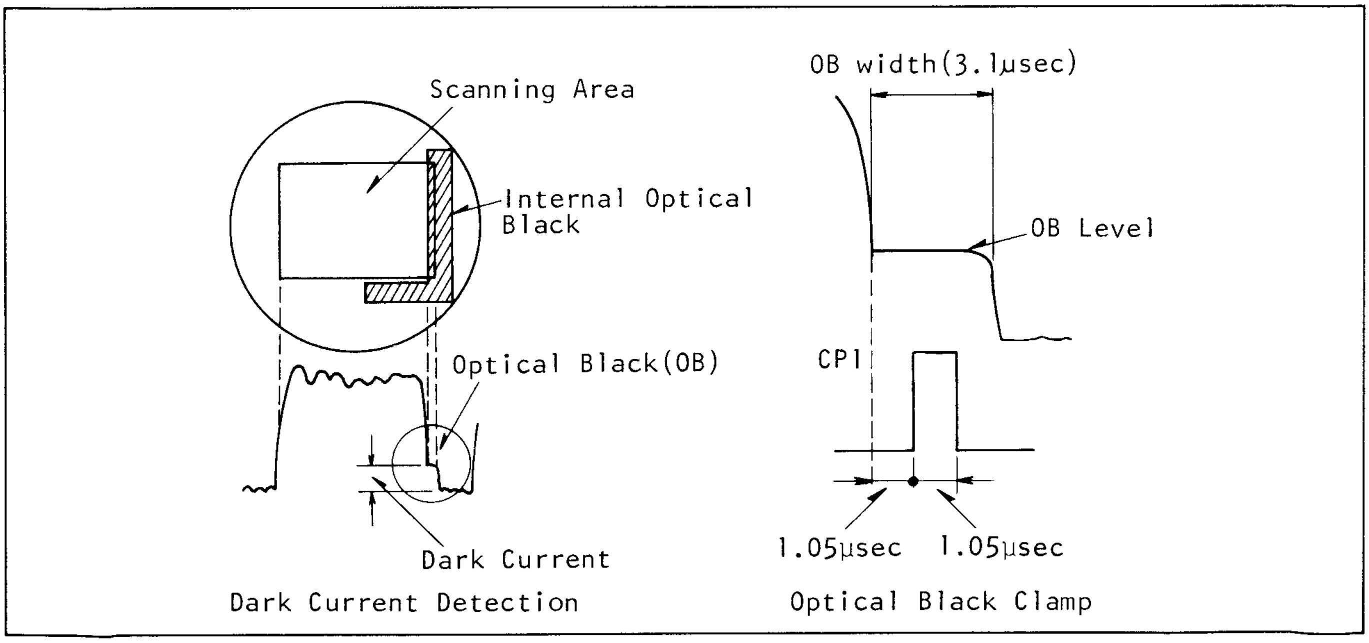

Scanning Area
Internal Optical Black
Optical Black(OB)
Dark Current
Dark Current Detection
OB width(3.1μsec)
OB Level
CP1
1.05μsec
1.05μsec
Optical Black Clamp

Fig. 16.

In addition, the target voltage is regulated by a circuit which senses yoke and tube temperature. Since dark current rises with temperature, if the temperature goes up, the target voltage regulator reduces voltage, rendering a constant dark current.

F. High luminance chroma clip circuit

When the incoming light to the vidicon is extremely high, the luminance level is increased in direct proportion to the incoming light, therefore, the modulated chroma signal from the vidicon is lowered in the inverse proportion to the incoming light until it finaly disappears so that a greenish picture will appear on the TV screen resulting in loss of white balance.

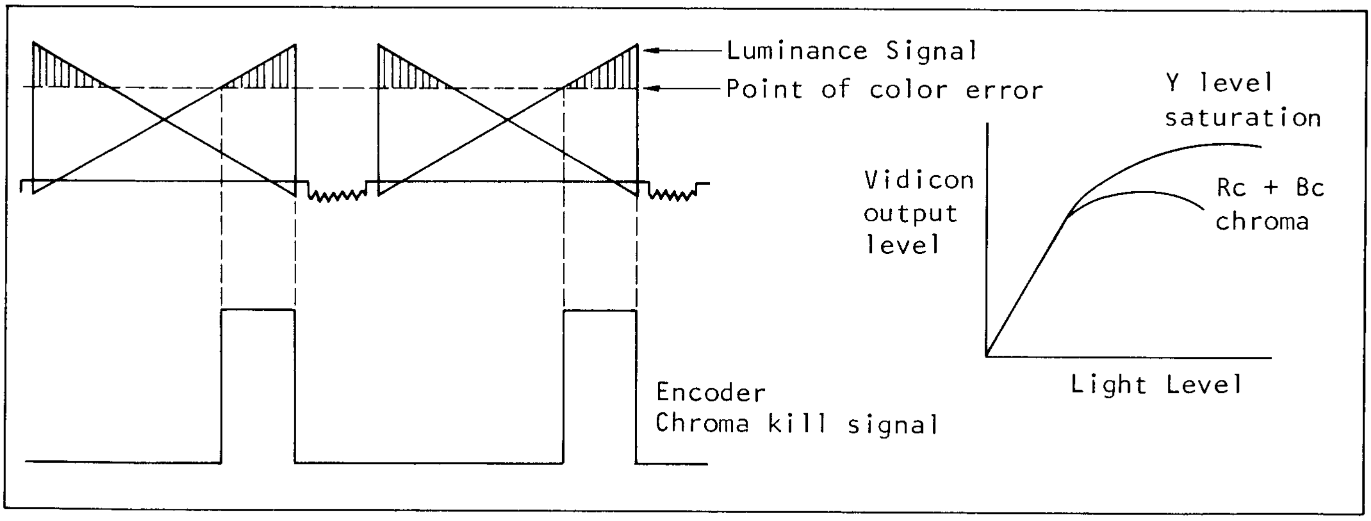

Luminance Signal
Point of color error
Encoder
Chroma kill signal
Y level
saturation
Vidicon
output
level
Rc + Bc
chroma
Light Level

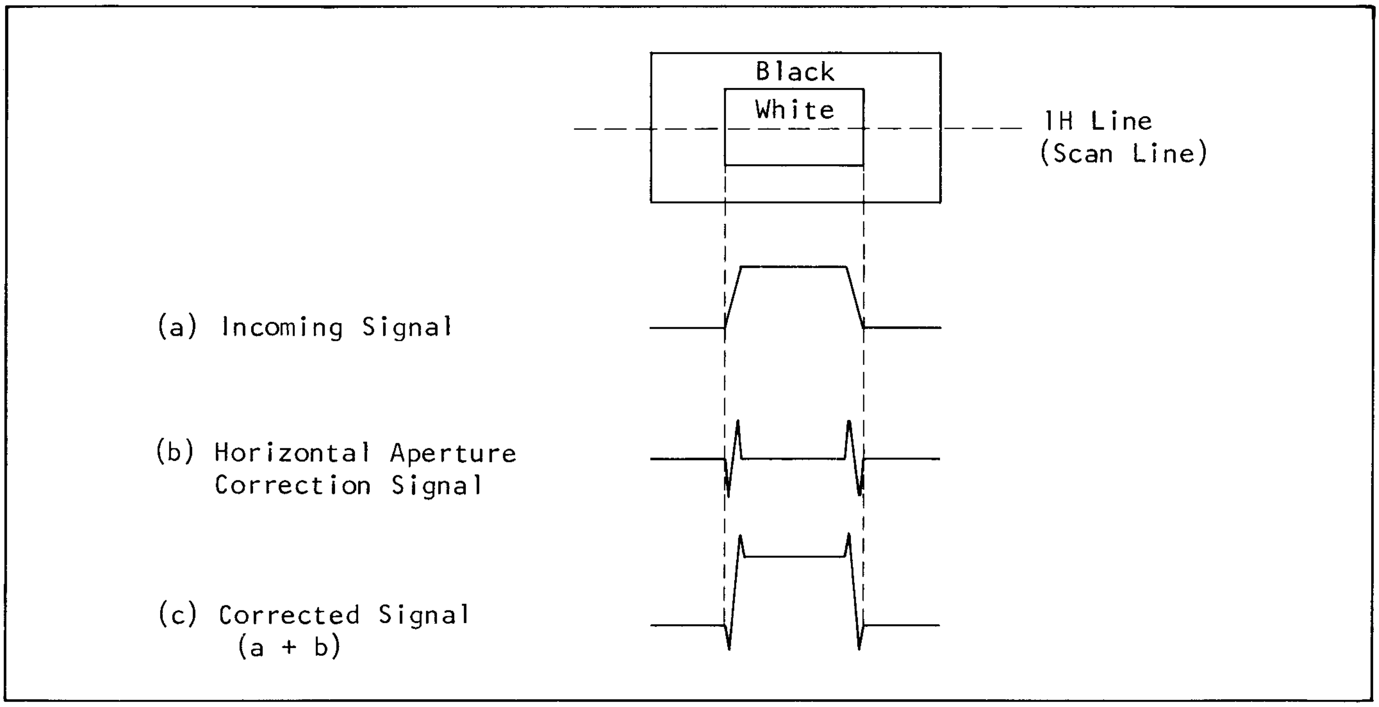
Fig. 17.

Therefore, a signal will be sent to the encoder to turn off the NTSC chroma modulators at peak whites. Since the chroma information, in the NTSC signal is difference information, the lack of chroma makes the peak signal appear white, rather than miscolored (Greenish picture).

G. Horizontal Aperture Correction

The electronic beam has some thickness, so that when the electronic beam is scanned on the vidicon face or CRT, it causes some loss of resolution.

To enhance the horizontal resolution, this correction circuit generates the horizontal aperture correction signal.



Black
White
1H Line
(Scan Line)
(a) Incoming Signal
(b) Horizontal Aperture
Correction Signal
(c) Corrected Signal
(a + b)

Fig. 18. Horizontal Aperture Correction

Overall Block Diagram and Description

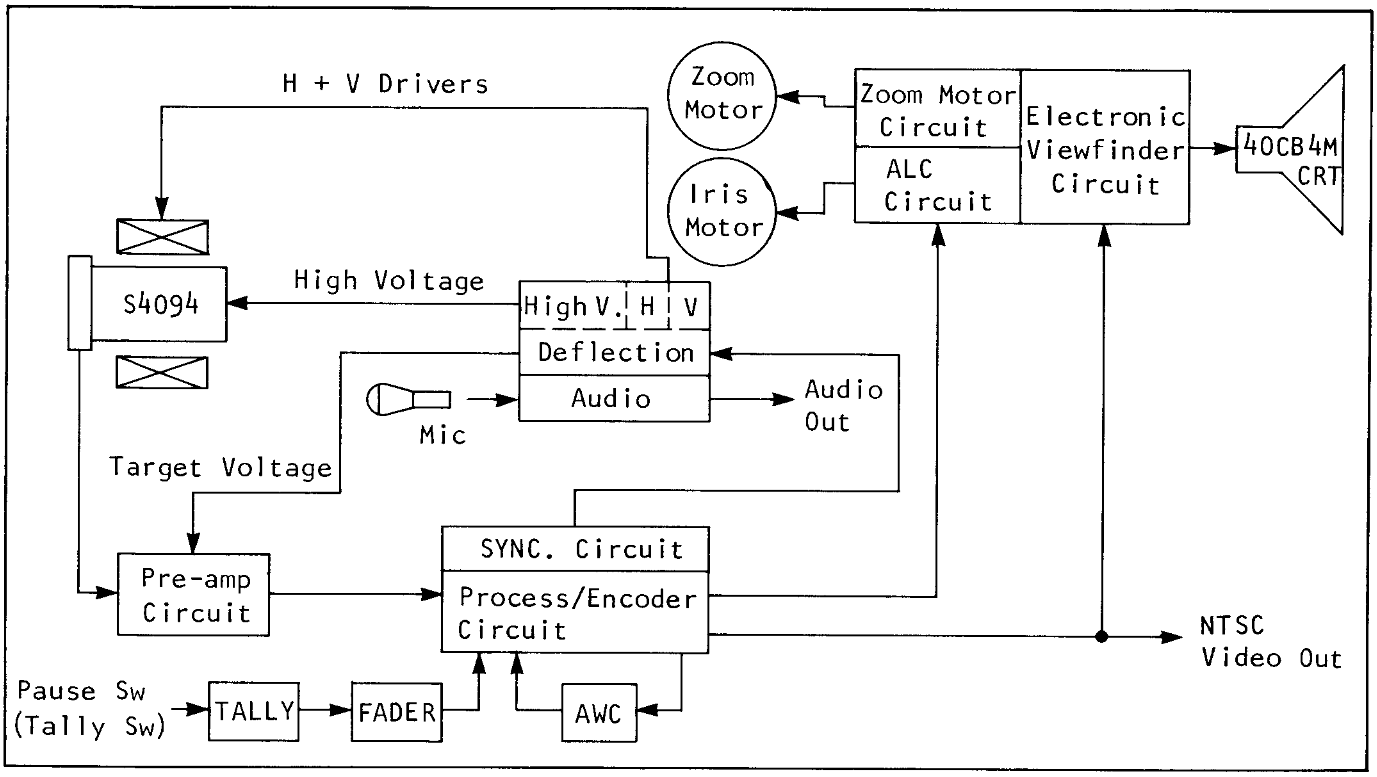

H + V Drivers
Zoom Motor
Iris Motor
Zoom Motor Circuit
ALC Circuit
Electronic Viewfinder Circuit
40CB4M CRT
S4094
High Voltage
High V.
H
V
Deflection
Audio
Mic
Audio Out
Target Voltage
SYNC. Circuit
Pre-amp Circuit
Process/Encoder Circuit
NTSC Video Out
Pause Sw (Tally Sw)
TALLY
FADER
AWC

Fig. 19. Simplified Overall Block Diagram

Lets look at a simplified overall block diagram (Fig. 19) first. The vidicon S4094 is supplied not only high voltage for tube elements, but also horizontal and vertical drives for the deflection coils wrapped around the vidicon. The vidicon is also supplied with a target voltage through the pre-amp. The output of the vidicon which amplifies the signal by 70 dB and maintains a good S/N ratio. The signal is now sent to the process and encoder circuits to be amplified the video and to separate the luminance from the red and blue carriers.

It is also gamma and degamma corrected, V. edge corrected, color shading corrected and also temperature corrected. The signal is a also sent through a matrix to produce R-Y and B-Y components.

Now the R-Y and B-Y signals are modulated with red and blue such carriers. The signal is further clip and finally sent to an AGC circuit and out to the EVF and NTSC output. The process and encoder also drives the automatic iris. The sync generator supplies the process and encoder with the necessary drives and such carriers.

Finally the camera can be powered by the VCR or with a AC power supply.

PRE-AMPLIFIER CIRCUIT

This simplified block diagram is shown in Fig. 20.

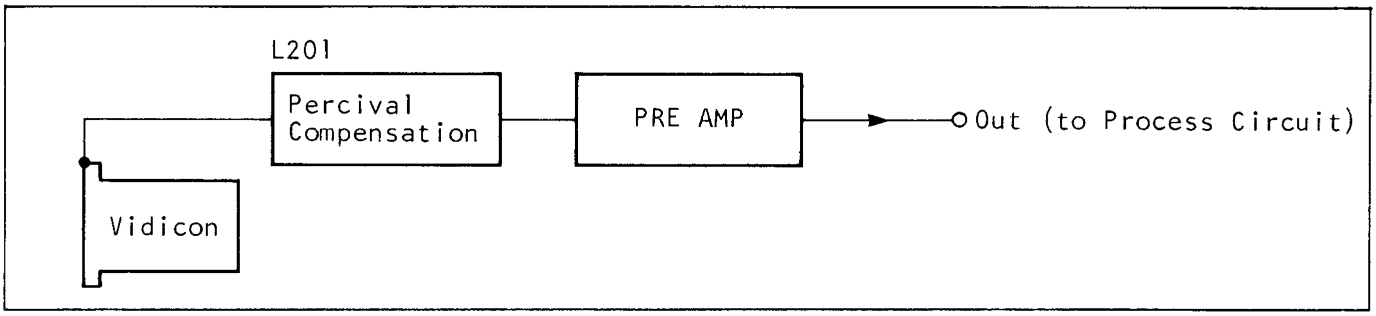


Fig. 20. Preamplifier Block Diagram

The modulated signal from the stripe filter is applied to the Preamplifier.

As you know the output of the vidicon is a very small level, about 200nA.

Therefore it has to be amplified to get a useful signal (about 70 dB up), so the S/n ratio is decided by the preamplifier circuit.

Because S/N ratio is so important in the pre-amplifier, we use a percival coil at the input. The combination of the vidicon's output capacitance, percival coil and input capacitance of the preamplifier FET creates a resonant circuit at 3.58 MHz ± 0.5 MHz. This will improve the S/N ratio by 6 dB (Fig. 21) at the input.

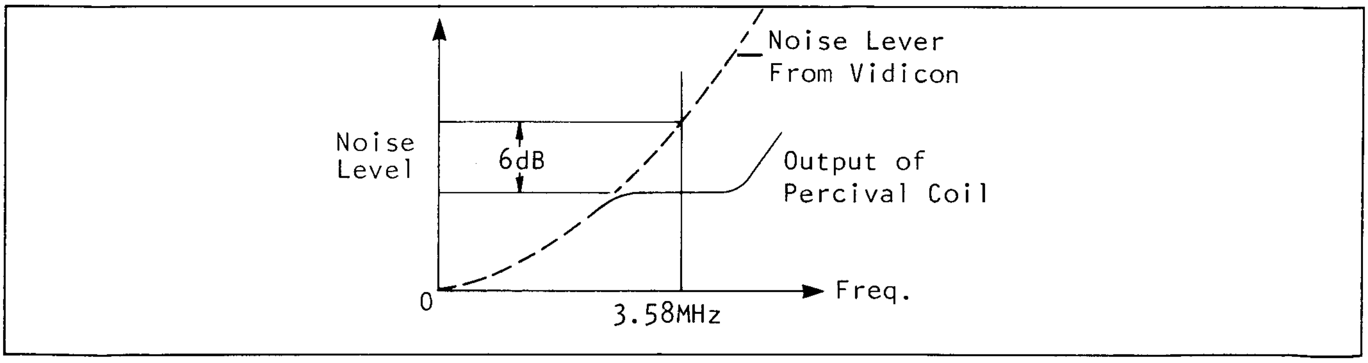
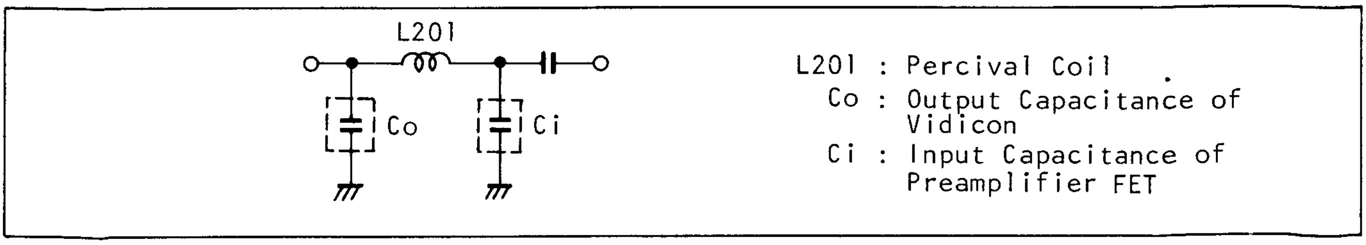


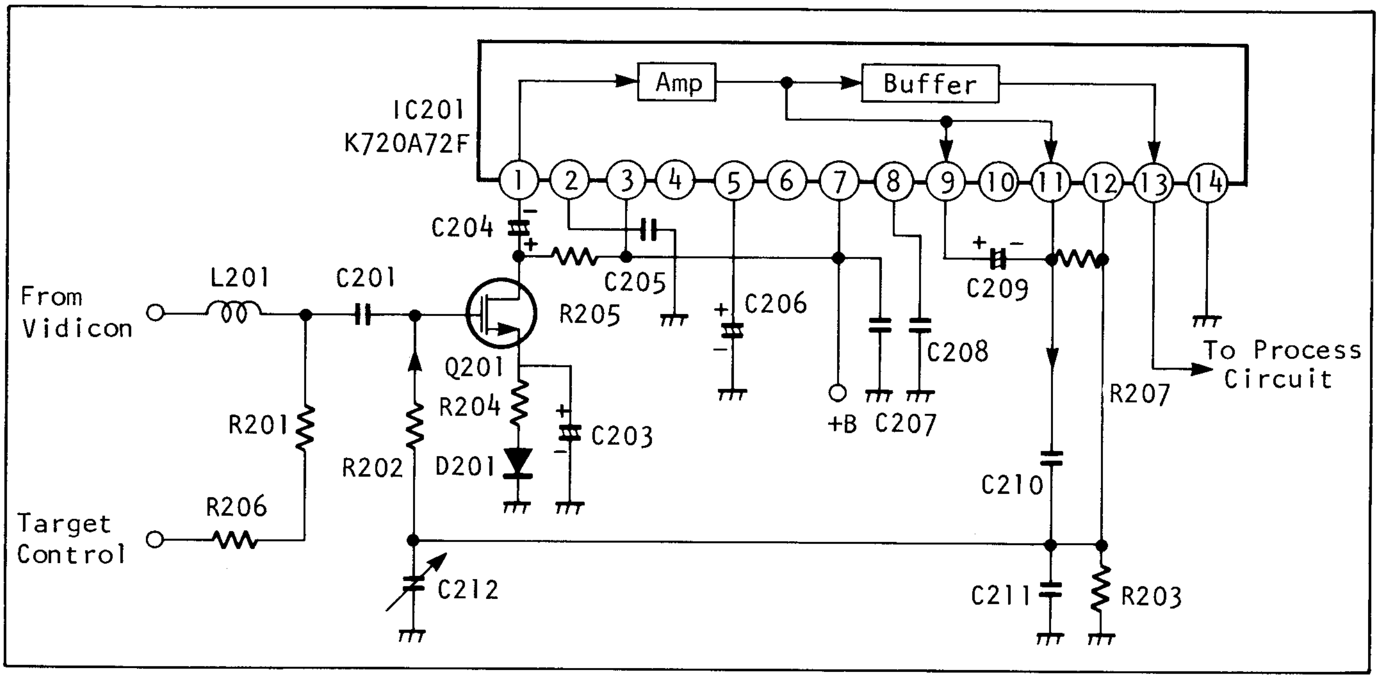
Fig. 21. Percival Correction



L201 : Percival Coil
Co : Output Capacitance of Vidicon
Ci : Input Capacitance of Preamplifier FET

Fig. 22. Percival Circuit

The preamplifier circuit is shown as following in Fig. 23.



Amp
Buffer
IC201
K720A72F
1
2
3
4
5
6
7
8
9
10
11
12
13
14
C204
C205
R205
C206
C209
From
Vidicon
L201
C201
Q201
R204
C203
C208
+B
C207
To Process
Circuit
R207
R201
R202
D201
C210
Target
Control
R206
C212
C211
R203

Fig. 23. Preamplifier Circuit

The modulated signal from the vidicon is applied through the percival coil to the FET Q201 which is a low impedance amplifier. The output of Q201 is sent to the Pin (1) of IC201 through C204. Then, the amplified signal is applied to Process Circuit from the Pin (13) of IC201. From Pin (11) of IC201 there is a negative feedback path to Q201 through C210, R203, C211, C212 and R202. This feedback circuit is used to improve the S/N ratio and increase the resolution.

By using a FET in the first stage of this circuit, the S/N ratio is much better than a transistor circuit, because of short-noise with no base gating current.

PROCESS CIRCUIT

The process circuit board encompasses several functions:

AGC (Automatic Gain Control)

Video amplification

Video signal separation: luminance/chrominance

Luminance separation: high band width (YH) (0-3 MHz)/low band (YL) (0-0.5 MHz)

Chrominance separation: Red/Blue Carrier

Chrominance gamma and degamma correction (γ and deγ)

Chrominance carrier detection: Red/Blue video

NTSC Chroma Matrix (R-Y, B-Y)

The video signal from the pre-amp contains both the luminance signal (picture detail) and a 3.58 MHz carrier containing the optically generated red and blue information which was described under stripe filter theory. Note that both the optically generated carrier frequency and the NTSC color subcarrier frequency made by the pulse generator are the same frequency (3.58 MHz) but are not the same signal. The function of the process circuit is to separate this signal into its component parts, process each of the signals for optimum performance, and prepare the signals for NTSC encoding.

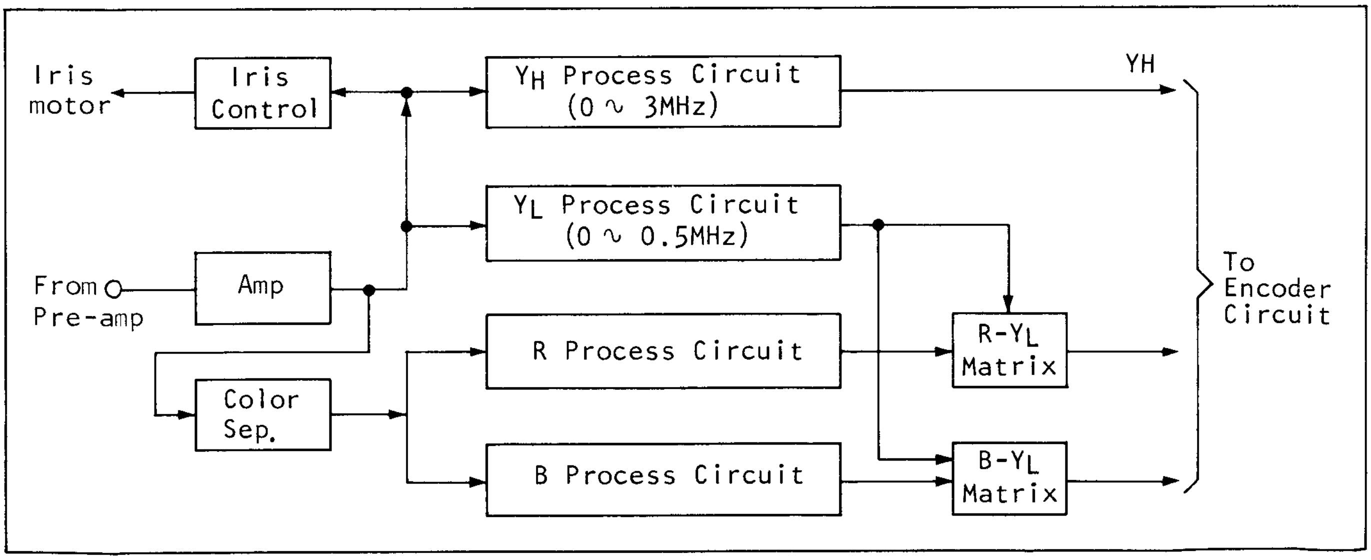

Iris motor
Iris Control
Y_H Process Circuit (0 ∿ 3MHz)
YH
Y_L Process Circuit (0 ∿ 0.5MHz)
From Pre-amp
Amp
Color Sep.
R Process Circuit
B Process Circuit
R-Y_L Matrix
B-Y_L Matrix
To Encoder Circuit

Fig. 24. Block Diagram of Process Circuit

The YH signal processing is done to form a wide bandwidth (0-3 MHz) video signal containing the picture detail. This will be the luminance component of the final output picture. The YL signal processing will form a luminance signal green of limited bandwidth (0-0.5 MHz) with a separate pedestal adjustment for the encoding process.

The Red and Blue processing circuits are virtually identical, and start with separation of Red and Blue carrier from the luminance signal, after the splitting of the Red and Blue information, color edge correction, gamma and degamma correction, color shading correction and detection are used to form 0-0.5 MHz bandwidth Red and Blue video signals. Finally the Red and Blue carrier signals are added to inverted YL to form R-YL and B-YL signals for application to the NTSC encoder modulators.

Automatic Lens Iris Control

Since the video signal amplitude depends on the light level striking the target, the video level is used to control the lens iris drive, which opens and closes the mechanical diaphragm in the lens. The lens drive mechanism is spring loaded so that when power is removed, the iris closes entirely. The motor is a limited rotation (120°) moving magnet device, much like a meter movement. The lens takes approximately 1 to 1.5 seconds to go from closed (f=45) to open (f=1.6).

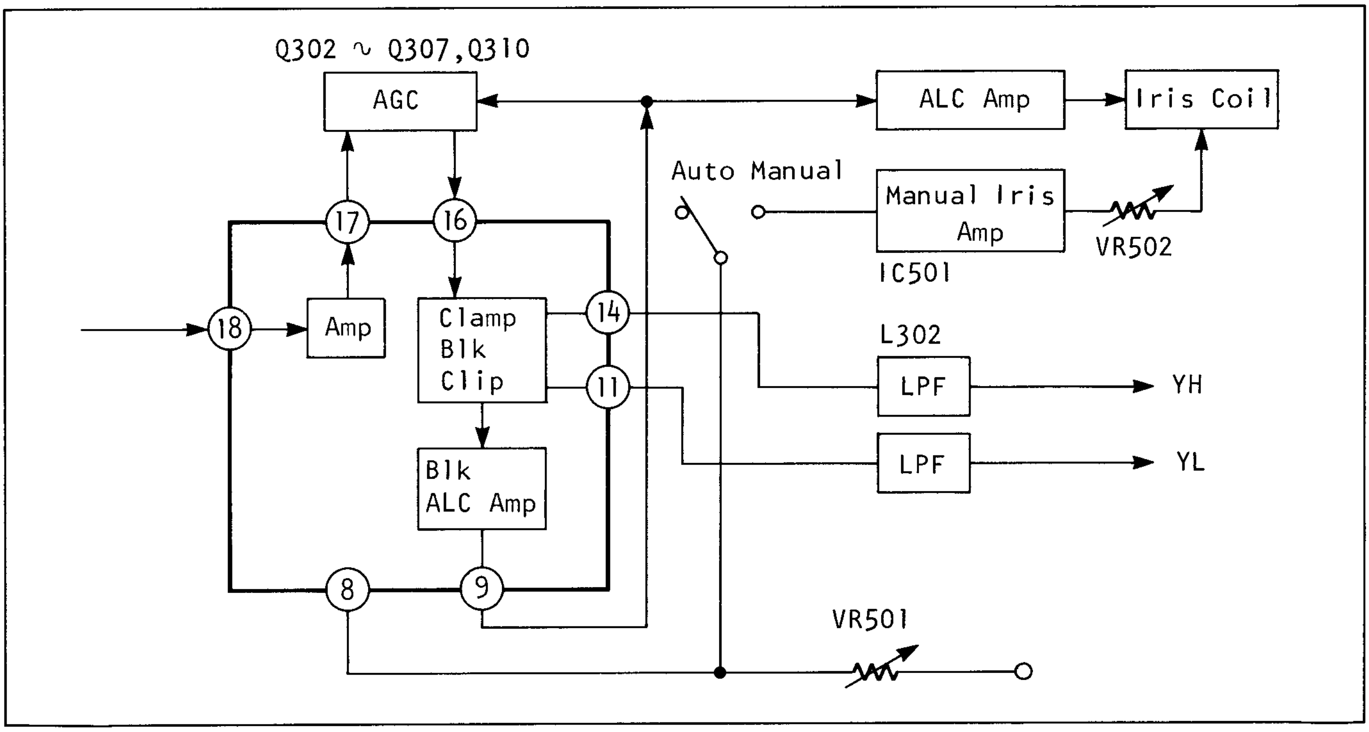

Q302 ∿ Q307,Q310
AGC
ALC Amp
Iris Coil
Auto Manual
Manual Iris Amp
VR502
IC501
17
16
18
Amp
Clamp Blk Clip
14
11
L302
LPF
YH
LPF
YL
Blk ALC Amp
8
9
VR501

Fig. 25. Simplified Iris Control Block Diagram

Encoder Circuit

This circuit performs the following basic functions:

1) The color difference signals (R-YL) and (B-YL) are separately AM modulate with 2 sub-carrier components whose phase differ by 90° (Fig. 26).

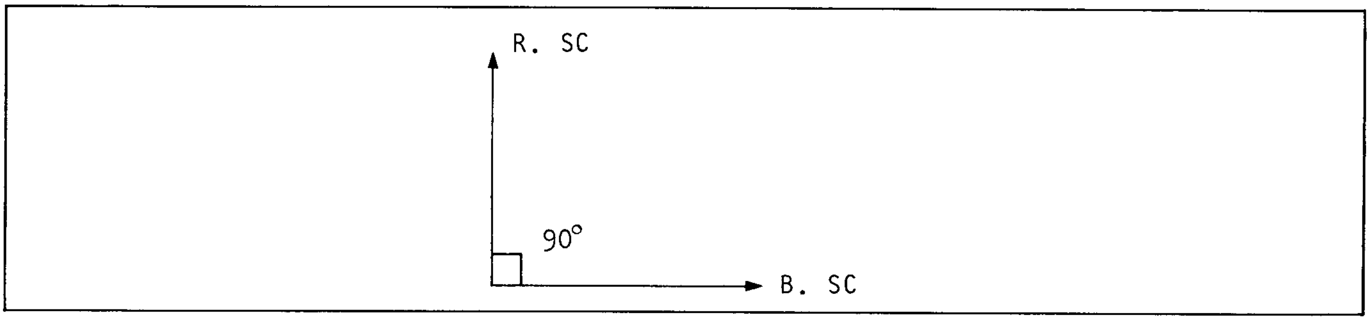


Fig. 26. The Phase Relation of R.SC-B.SC

2) When the two AM signals are added it results in a chrominance signal on a 3.58 MHz sub-carrier. The amplitude of this quadrature AM modulated signal carries information in regard to the saturation or vividness of the colors, while the relative phase (with respect to burst) carries information which specifies the hue of a particular color.
3) This signal is further processed in the Chroma Process circuits which eliminates all color in extreme high signal where perfect color reproduction is difficult to obtain (signal extremes).
4) The "1/2fh beat" prevention circuit prevents chroma amplitude (saturation) difference between adjacent horizontal lines. The line-to-line amplitude difference is a possible by-product of color decoding process. This circuit averages this difference preventing a symptom which resembles line pairing (only in color). The line pairingcaused by difference of color gain for each horizontal line is like color beat (but not real color beat).

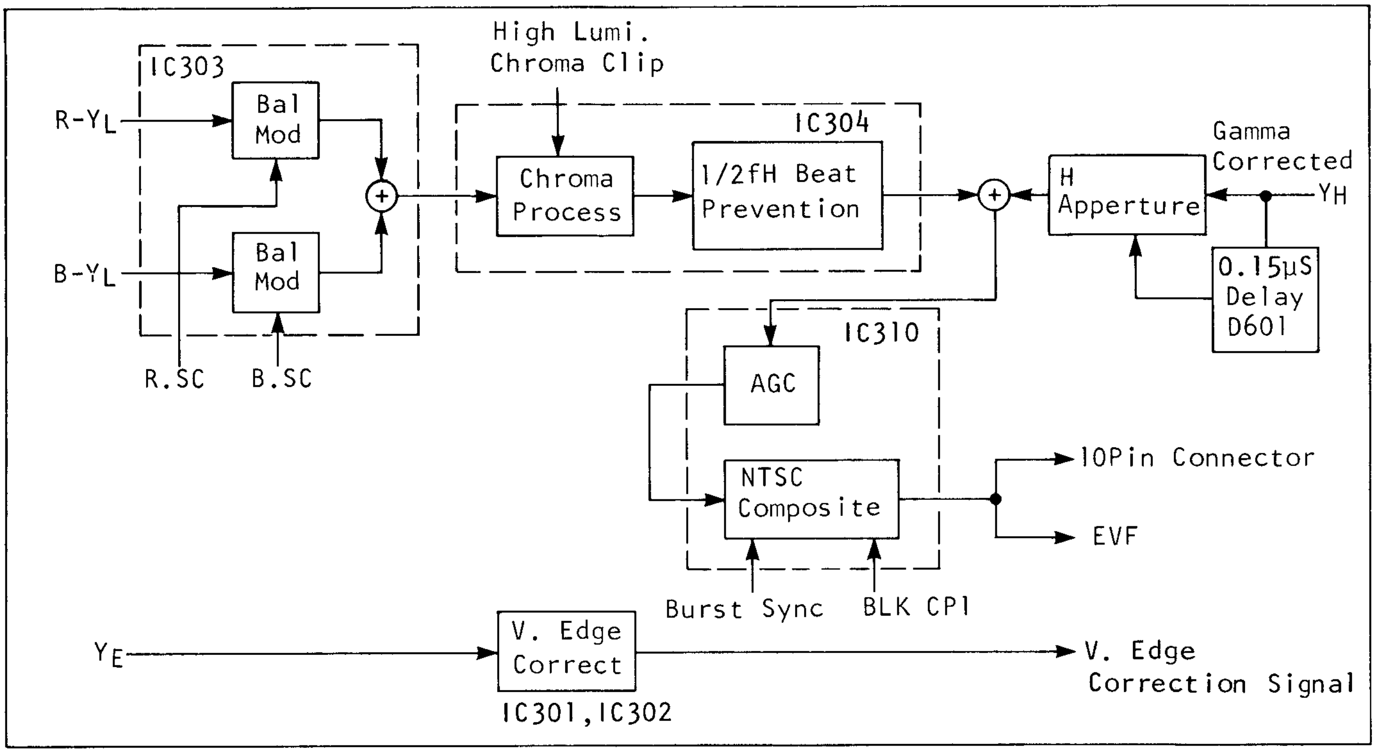

IC303
R-YL
B-YL
Bal Mod
Bal Mod
+
R.SC
B.SC
High Lumi. Chroma Clip
IC304
Chroma Process
1/2fH Beat Prevention
+
H Apperture
Gamma Corrected
YH
0.15μS Delay D601
IC310
AGC
NTSC Composite
10Pin Connector
EVF
Burst Sync
BLK CP1
YE
V. Edge Correct
IC301,IC302
V. Edge Correction Signal

Fig. 27. Block Diagram of Encoder Circuit

5) AGC is performed on the combined luminance and chroma signal (Y + C) to prevent uneven level extremes between Y and C which could affect recording performance.

6) A composite NTSC signal is formed by the addition of SYNC, BURST, and BLK. It then goes to EVF (if this option is used) and pin (1) of the 10-pin connector to the VCR. The VCR playback signal (which is sent on top of a DC level) will shut off the encoded video from the camera and route itself to the EVF during VCR playback.

7) The YE signal is sued to form an edge signal for V. Edge Correction used in the process circuit. To correct color fringing (Mg of Gr) in picture parts which contain line-to-line contrast.

DEFLECTION CIRCUIT

Main Functions

1. Generate Deflection Waveforms
    a. H Deflection
    b. V Deflection
    c. Vidicon Protection
2. Generate High Voltage to Operate Vidicon
    a. Target
    b. Grids
    c. Cathode Blanking
3. Vidicon Compensation
    a. Dark Shading
    b. Dynamic Focus
    c. Color (Signal) Shading

1. Generation of Deflection Waveforms

Horizontal and vertical beam deflection is accomplished by the H and V deflection signals sent through the deflection coils.

The H and V deflection signals are sawtooth waveforms generated by both transistors and IC, then amplified and controlled by their own IC stages. The V deflection signal is a near-perfect sawtooth.

This yields a very linear vertical sweep of the vidicon target.

The H deflection signal is a somewhat distorted sawtooth.

This is done to ensure a linear horizontal scan start even after the extremely rapid retrace at the end of each line scan.

If either of the deflection signals failed for any reason, the beam would continually scan either one horizontal or one vertical line on the target. Or, if both failed, the beam would be concentrated on one spot in the center of the target. Any of these conditions can burn the target--and this is not desirable.

Vidicon protection is incorporated so that if any deflection signals fail--the flyback transformer (T601) used to make the high voltage to operate the vidicon will be disabled.

2. Generation of High Voltage to Operate Vidicon

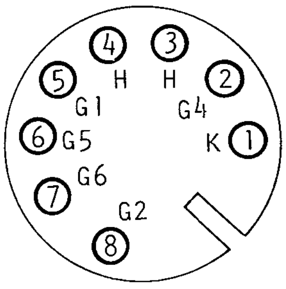
The vidicon, being a vacuum tube, requires high voltage in order to create an electron beam.

Grid voltages up to 1600V DC are required. Focus, beam, and cathode voltages are also necessary.

The high voltage DC is derived from a fly back transformer. The horizontal signal is used to make high voltage because it is easier to generate high voltages from high frequency signal with transformer action.

The counted down H deflection signal is used in the primary winding of a step-up transformer and the output is diodecapacitor quadrupled to obtain up to 1600V DC.

Voltages Required	
Grid 6 (MESH) G3	1600V
Grid 5	800V
Grid 4 (FOCUS)	230V (variable 200 ∿ 250V)
Grid 2	350V
Grid 1 (BEAM)	-80V (Variable 0 ∿ -80V)
TARGET	80V (variable 0 ∿ 80V)
CATHODE BLANKING	20V



Vidicon Socket

Fig. 28.

Cathode blanking signals are a combination of H & V drive signals which turn the electron beam off during Vertical and Horizontal retrace. There is no picture information needed at these times--so to prevent noise--the beam is turned off.

3. Compensation Circuits

There are inherent imperfections in any vidicon--striped or not. Compensation circuits are used to make correct these imperfection and make a better picture. The S4094 used here is striped and uses an optical black (O.B.) strip.

The O.B. strip prevents light from reaching the target just at the area at the end of horizontal scan.

The "no-light" signal output from the tube when O.B. is scanned is used as a black reference for the picture. The area of the target behind O.B. never receives light, and behaves differently from the lighted area of the target. Another form of compensation which applies a signal to the vidicon cathode is Dark Shading. All areas of the target may not be equal due to manufacturing. The target can yield slightly different responses at its corners compared to the center, etc. A horizontal rate sawtooth signal and a horizontal rate parabolic signal are adjustably combined and added to the O.B. Offset signal, amplified and applied to the cathode. This should pretty much compensate for target imperfections.

Another set of compensation signals applied to the vidicon is Dynamic Focus. In order for the vidicon to produce good color signals, the beam must stay in focus throughout its entire area of scan.

The main focus grid provides good focus, but it can only be guaranteed in the center of the target.

But at other areas of scan, the beam focus can vary slightly.

To compensate for this, correction signals are applied to the focus grid along with the focus voltage.

There are four waveforms that make up the dynamic focus signal--H & V sawtooth, and H & V parabola. All are adjustable in both polarity and amplitude, are mixed together in a single transistor amplifier. There are also dedicated stages used to make parabolic waveforms out of the sawtooth waveforms obtained from the deflection stages. The H, V sawtooth and parabolic waveforms are also used in another compensation circuit. In two circuits very similar to the dynamic focus stage, correction signals are developed for use on the signal processing board. These are the Red Color Shading signals and the Blue Color Shading signals, used by the red and blue signal detectors, respectively. The purpose of the Color Shading signals is to allow for very uniform color reproduction over the entire area of target scan--compensating for imperfections again in the target structure or even the color stripe filter built in the faceplate.

4. Low Voltage Power Supply

The camera operates on +9V DC regulated down from a +12V DC source. A standard zener referred power circuit is used.

PULSE GENERATOR CIRCUIT

This circuit will generate all the pulses needed by the camera. The pulse generator (Fig. 29.) has 6.6 V supplied to pin (1) and 14.31818 MHz supplied by X302 X'tal.
From the 14.31818 MHz signal, we develope the necessary signals listed in Fig. 30.

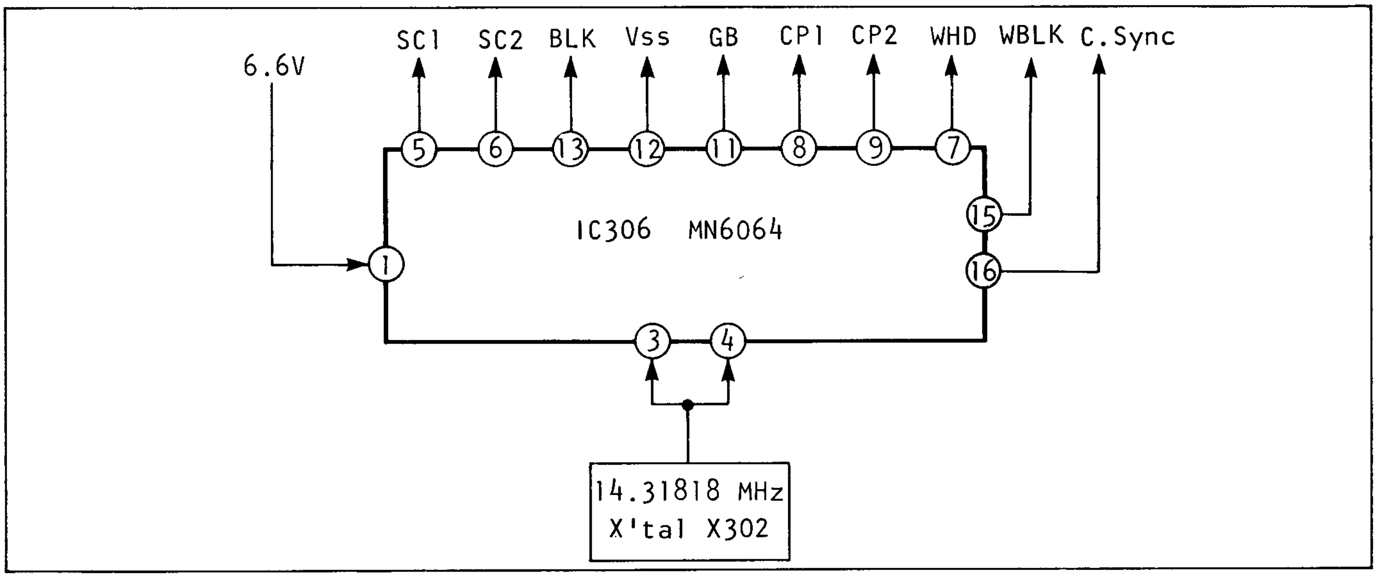
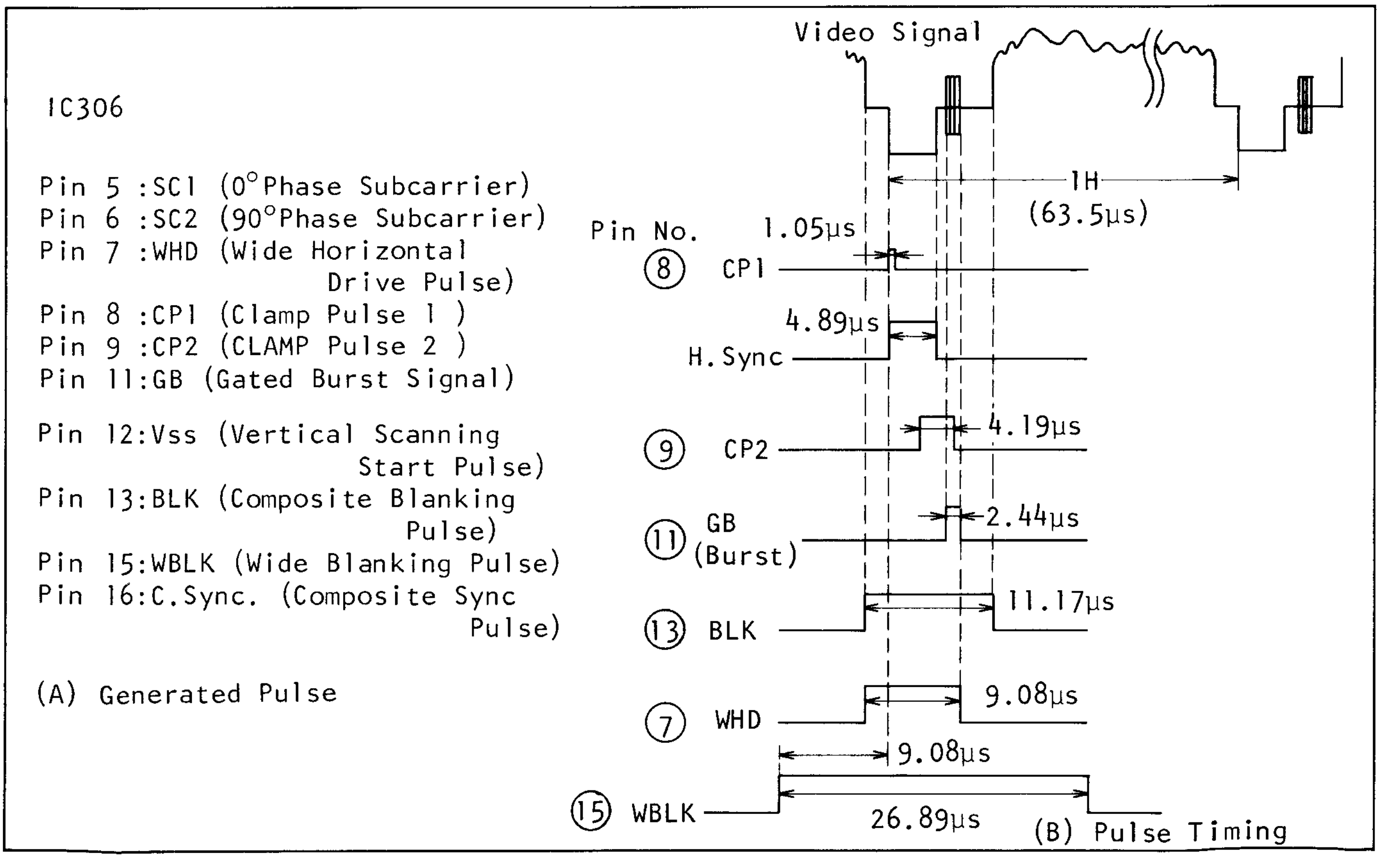

6.6V
SC1
SC2
BLK
Vss
GB
CP1
CP2
WHD
WBLK
C.Sync
⑤
⑥
⑬
⑫
⑪
⑧
⑨
⑦
⑮
⑯
①
③
④
IC306 MN6064
14.31818 MHz
X'tal X302

Fig. 29. Pulse Generator Circuit



IC306

Pin 5 :SC1 (0°Phase Subcarrier)
Pin 6 :SC2 (90°Phase Subcarrier)
Pin 7 :WHD (Wide Horizontal Drive Pulse)
Pin 8 :CP1 (Clamp Pulse 1)
Pin 9 :CP2 (CLAMP Pulse 2)
Pin 11:GB (Gated Burst Signal)
Pin 12:Vss (Vertical Scanning Start Pulse)
Pin 13:BLK (Composite Blanking Pulse)
Pin 15:WBLK (Wide Blanking Pulse)
Pin 16:C.Sync. (Composite Sync Pulse)

(A) Generated Pulse

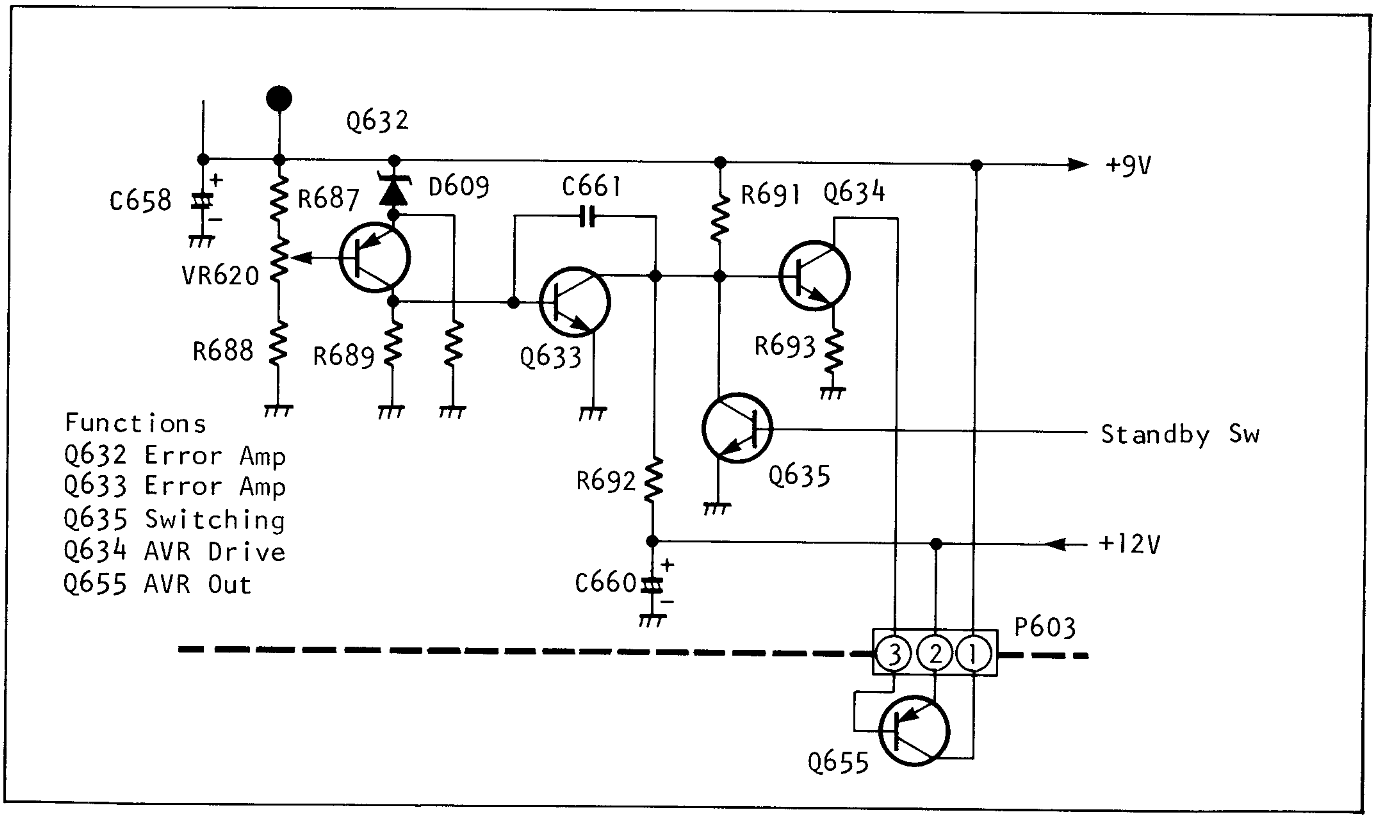
Video Signal
1H
(63.5μs)
Pin No.
1.05μs
⑧ CP1
4.89μs
H.Sync
4.19μs
⑨ CP2
2.44μs
⑪ GB (Burst)
11.17μs
⑬ BLK
9.08μs
⑦ WHD
9.08μs
⑮ WBLK
26.89μs
(B) Pulse Timing

Fig. 30. Generated Pulses

9 VOLT REGULATOR

The +9V adjustment is VR620 , in the voltage divider base of Q632 . Adjust for +9V DC under loaded conditions.

Functions: Q632 -- Error Amp
Q633 -- Error Amp
Q635 -- Switching (Standby/Operate)
Q634 -- AVR Drive
Q655 -- AVR Out



Q632
+9V
C658
R687
D609
C661
R691
Q634
VR620
R688
R689
Q633
R693
Functions
Q632 Error Amp
Q633 Error Amp
Q635 Switching
Q634 AVR Drive
Q655 AVR Out
Standby Sw
R692
Q635
+12V
C660
P603
3
2
1
Q655

Fig. 31. 9 Volt Regulator Circuit

ORDER NO. VRD-8105-543

Service Manual

Color Video Camera

PK-751

Vol. 2

Troubleshooting Guide Adjustment Procedures

SPECIFICATIONS:

Power Source: DC 12 V ± 10%
AC 120 V ± 10%, 60 Hz ± 0.5% (with Power Supply Unit)
Power Consumption: (with E.V.F) DC 7.2 W at 12 V (Battery)
DC 0.7 W at Standby
Vidicon Tube System: 2/3″ frequency separation single tube system (built-in stripe filter)
Signal Carrier Frequency: 3.58 MHz
Focus System: Electro-static type
Lens Mounting: Built-in zoom lens (not "C" mount)
Lens: 6:1 zoom lens with auto/manual iris control.
Auto zoom lens and macro construction.
F: 1.6, f: 12 mm—72 mm
d: 1 m—infinity
Light Sensitivity: Minimum light intensity on optical image: 80 Lux (F: 1.6)
Optimum light intensity on optical image: 90 Lux
Video Output Level: 1.0 Vp-p, 75Ω (M type coaxial connector) (Standard NTSC color signal)
Sync. System: Internal Sync: RS-170
Signal to Noise Ratio: Greater than 43 dB (luminance signal)
Horizontal Resolution: More than 240 lines
Color Temperature Control: 2 ~~step~~ switch (indoor, outdoor) & Auto adjust

Microphone: Condenser Microphone
Audio Output Level: −20 dB, Hi-impedance
Audio Output Impedance: High impedance (1 KΩ)
External Microhpone Input Impedance: 600Ω
Electronic Viewfinder: Monochrome 1.5 inch CRT
Operating Temperature: 5°C to 40°C
Operating Humidity: 10% to 75%
Operating Position: Normal position only
Weight: Camera Head with E.V.F
6.1 lbs (with Lens, 7 ft cable & shoulder pad/handle grip)
AC adaptor (option)
2.4 lbs
Demensions: Camera Head with E.V.F
7″(W) × 8″(H) × 13″(D)
177 mm(W) × 210 mm(H) × 318 mm(D)
AC adaptor (option)
3″(W) × 3″(H) × 6″(D)
80 mm(W) × 75 mm(H) × 149 mm(D)

Weight and dimensions shown are approximate.
Specifications are subject to change without notice.

Panasonic®

Panasonic Company
Division of Matsushita Electric
Corporation of America
One Panasonic Way, Secaucus,
New Jersey 07094

Panasonic Hawaii, Inc.
320 Waiakamilo Road, Honolulu,
Hawaii 96817

Panasonic Canada
Division of Matsushita Electric
of Canada Limited
5770 Ambler Drive, Mississauga,
Ontario, L4W 2T3

Panasonic Sales Company,
Division of Matsushita Electric
of Puerto Rico, Inc.
Ave, 65 De Infanteria, KM 9.7
Victoria Industrial Park
Carolina, Puerto Rico 00630

PRODUCT COMPLIES WITH DHEW RULES 21CFR SUBCHAPTER J APPLICABLE AT DATE OF MANUFACTURE

SAFETY PRECAUTION

GENERAL GUIDELINES

1. When service is required, observe the original lead dress. Components, wires or cables that indicate evidence of overheating or other electrical or mechanical damage should be replaced.
2. After servicing the camera, power supply and electronic viewfinder, all the protective devices, such as insulation tape, shields and isolation R-C combinations must be properly installed.
3. Potentials as high as 5KV are present when the electronic viewfinder is operating. Operation without the camera head side covers, finder case ass'ys of electronic viewfinder and covers of power supply unit presents a danger of shock hazard from the camera power supply. Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions that should be taken when working on high-voltage equipment. Always discharge the anode of the picture tube to the main chassis before handling the tube.
4. After servicing, make the following leakage current checks to prevent the customer from being exposed to shock hazards.

LEAKAGE CURRENT COLD CHECK

Conduct this test on the power supply unit with the camera disconnected and repeat with the camera, power supply unit and electronic viewfinder properly assembled. Also, repeat test with and without available approved accessories/cables/connectors.

1. Turn the AC switch on.
2. Measure the resistance value, with an ohmmeter, between the jumpered AC plug and each exposed terminal, screwheads and coaxial connector. The resistance measured should not be less than ∞(infinity). Any resistance value below this range indicates an abnormality which requires corrective action.
3. Repeat the test with the AC switch in the "off" position.

LEAKAGE CURRENT HOT CHECK

Conduct this test on the power supply unit with the camera disconnected and repeat with the camera, power supply unit and electronic viewfinder properly assembled. Also, repeat test with and without available approved accessories/cables/connectors.

1. Plug the AC cord directly into the AC outlet. Do not use an isolation transformer for this check.
2. Connect a 1.5KΩ 10 watt resistor, paralleled by 0.15μF capacitor, between each exposed metallic part on the unit and a good earth ground such as a water pipe, as shown in figure 1.
3. Use an AC voltmeter, with 1000Ω/volt or more sensitivity, to measure the potential across the resistor.
4. Check all exposed metallic parts of the cover (Cable connection, Handle bracket, metallic cabinet, Screwheads, Metallic overlays, etc), and measure the voltage at each point.
5. Reverse the AC plug in the AC outlet and repeat each of the above measurements.
6. The potential at any point should not exceed 0.75 V RMS. A leakage current tester (FLUKE MODEL: 8000A equivalent) may be used to make the hot checks. Leakage current must not exceed 0.5 milliamp. In case a measurement is out side of the limits specified, there is a possibility of a shock hazard, and corrective action must be taken before returning the instrument to the customer.

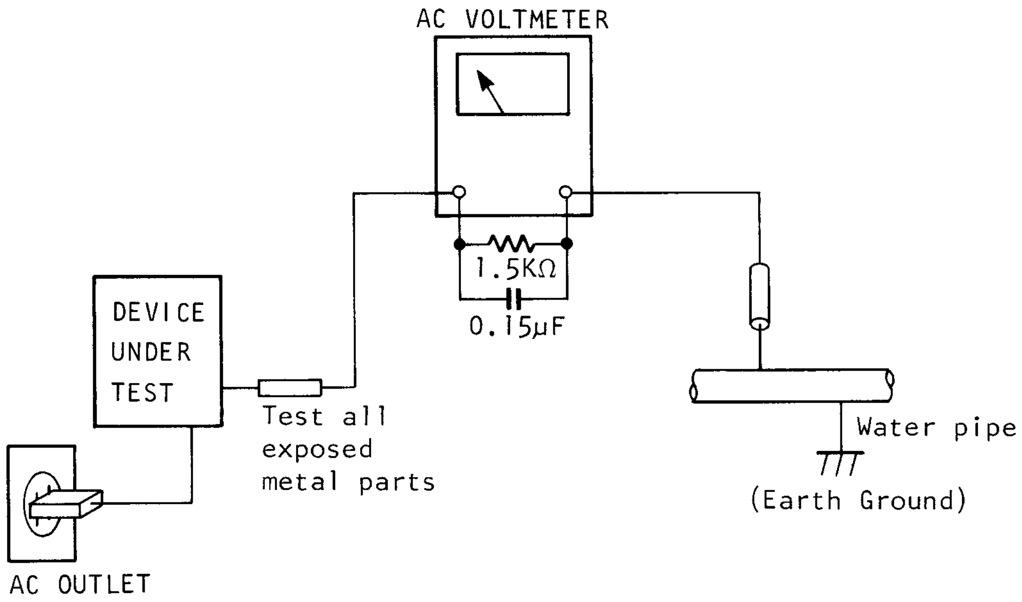

AC VOLTMETER
1.5KΩ
0.15μF
DEVICE UNDER TEST
Test all exposed metal parts
Water pipe
(Earth Ground)
AC OUTLET

Figure 1. Leakage Current Hot Check

X - RADIATION

1. The potential source of x-radiation in electronic view finder is the high - voltage section and picture tube.
2. It is important to use a periodically checked and accurate high-voltage meter, to monitor and check the high voltage.
   Rotate the brightness control and contrast fully counterclockwise for this test.
3. Observe that the high voltage does not exceed the specified value.
   Excessive high voltage may cause a possible x-radiation hazard.
   The camera system should be repaired as soon as possible.
4. It is essential to use the specified picture tube to avoid a possible x-radiation hazard.

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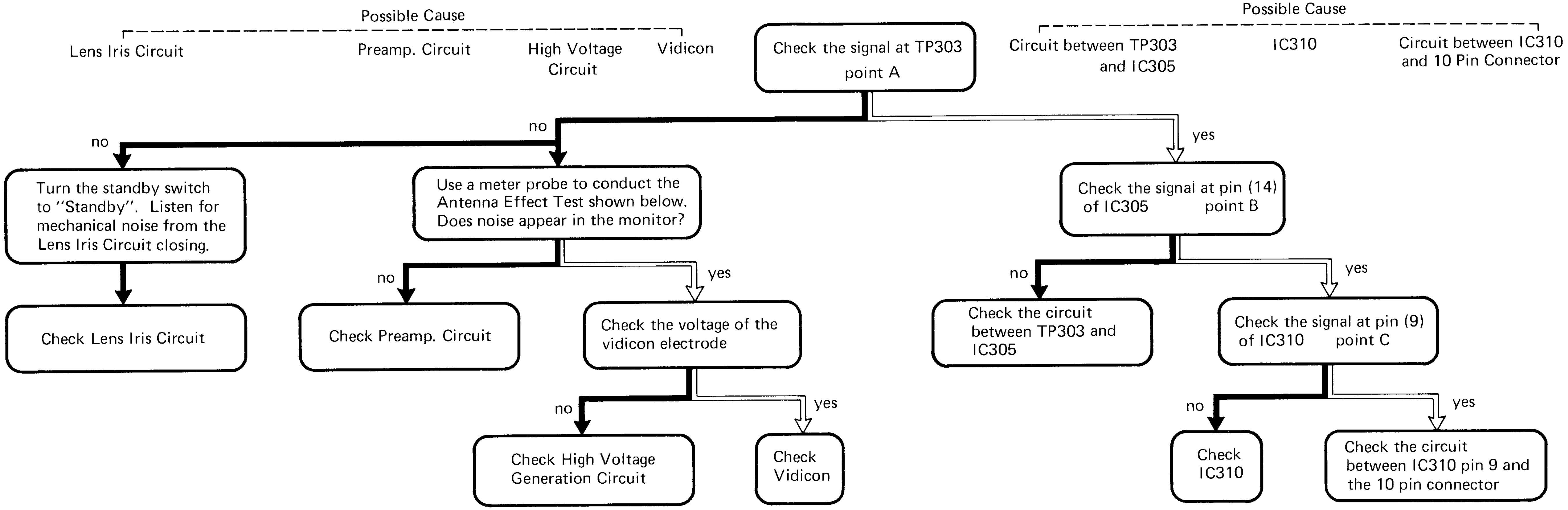
LUMINANCE SECTION

SERVICE FLOW CHART

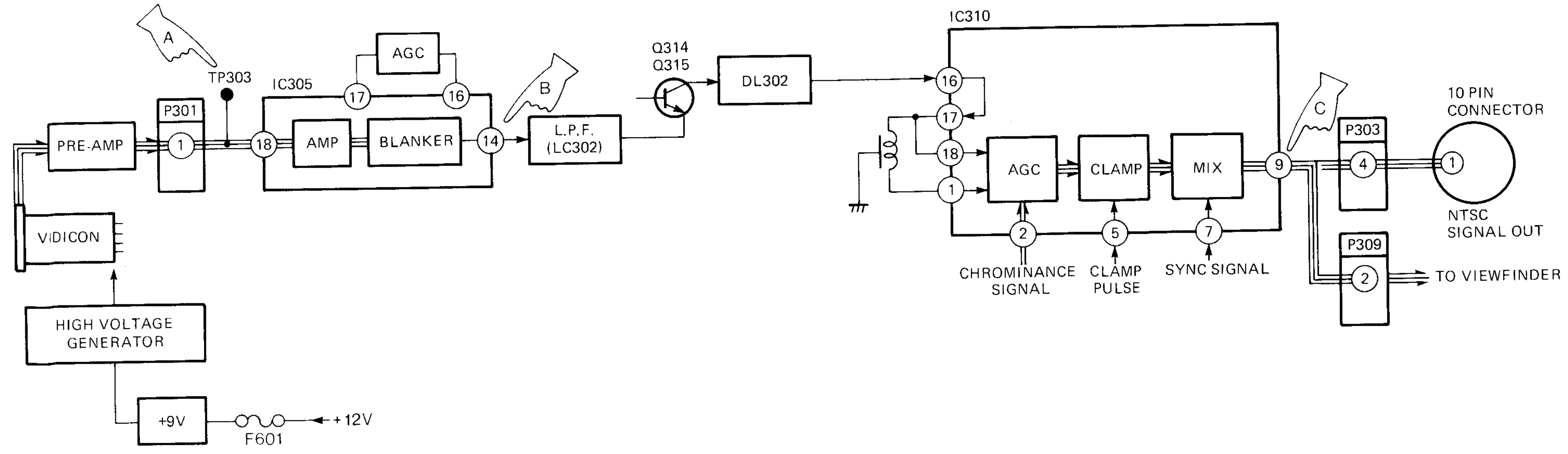
NO PICTURE

If there is no picture, Test Point TP303 is the suggested place to start Checking.
If there is signal at TP303 follow the "Yes" path. If no signal is present, follow the "No" path.

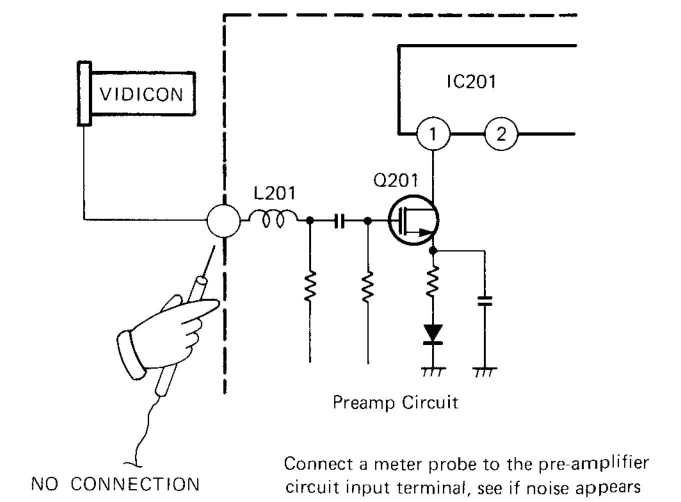


Possible Cause
Lens Iris Circuit
Preamp. Circuit
High Voltage Circuit
Vidicon
Check the signal at TP303 point A
Possible Cause
Circuit between TP303 and IC305
IC310
Circuit between IC310 and 10 Pin Connector
no
no
yes
Turn the standby switch to "Standby". Listen for mechanical noise from the Lens Iris Circuit closing.
Use a meter probe to conduct the Antenna Effect Test shown below. Does noise appear in the monitor?
Check the signal at pin (14) of IC305 point B
Check Lens Iris Circuit
no
yes
Check Preamp. Circuit
Check the voltage of the vidicon electrode
no
yes
Check the circuit between TP303 and IC305
Check the signal at pin (9) of IC310 point C
no
yes
Check High Voltage Generation Circuit
Check Vidicon
no
yes
Check IC310
Check the circuit between IC310 pin 9 and the 10 pin connector

SIGNAL FLOW CHART



A
TP303
IC305
AGC
17
16
B
PRE-AMP
P301
1
18
AMP
BLANKER
14
L.P.F. (LC302)
Q314
Q315
DL302
VIDICON
HIGH VOLTAGE GENERATOR
+9V
F601
+12V
IC310
16
17
18
1
AGC
CLAMP
MIX
9
2
5
7
CHROMINANCE SIGNAL
CLAMP PULSE
SYNC SIGNAL
C
P303
4
1
10 PIN CONNECTOR
NTSC SIGNAL OUT
P309
2
TO VIEWFINDER



VIDICON
IC201
1
2
L201
Q201
Preamp Circuit
NO CONNECTION

Connect a meter probe to the pre-amplifier circuit input terminal, see if noise appears in the video output (on the monitor).

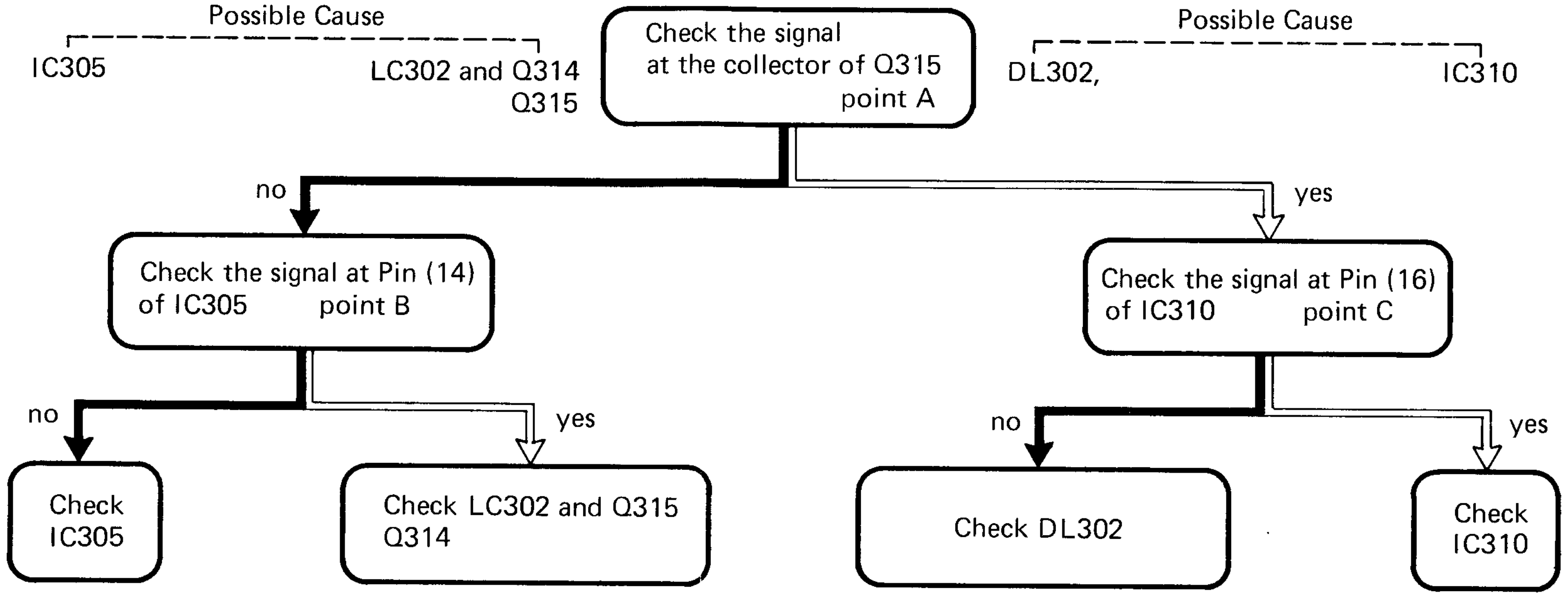
Fig. 1 Antenna Effect Test

LUMINANCE SECTION

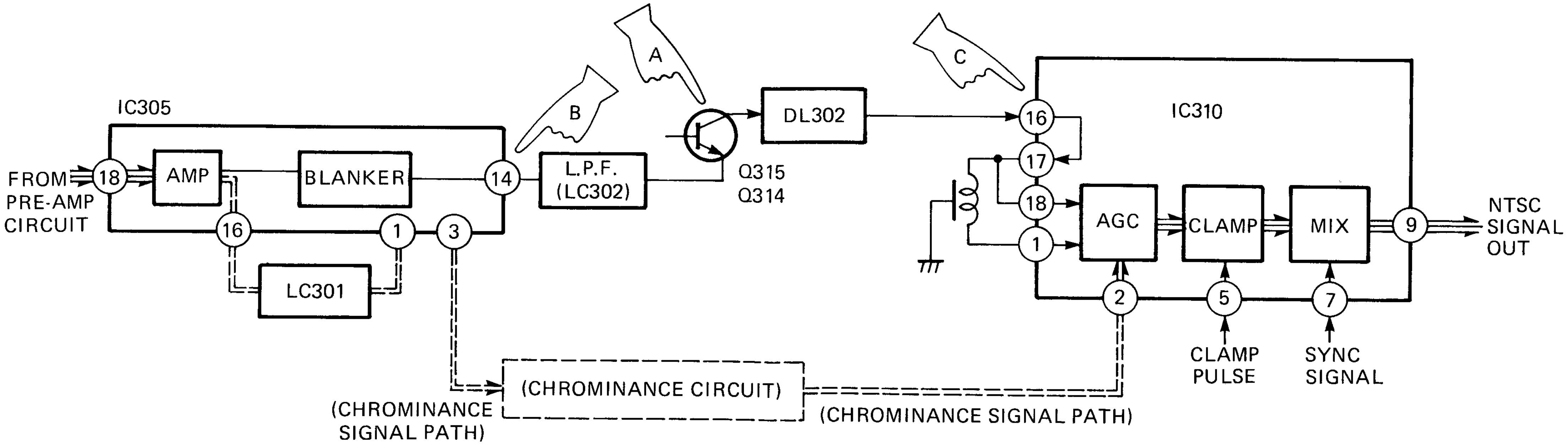
SERVICE FLOW CHART

NO PICTURE
(Only Color Signal)

If there is no picture, the collector of Q315 is the suggested place to start checking.
If there is signal at the collector of Q315, follow the "Yes" path.
If no signal is present, follow the "No" path.


Possible Cause
IC305
LC302 and Q314
Q315
Check the signal
at the collector of Q315
point A
Possible Cause
DL302,
IC310
no
yes
Check the signal at Pin (14)
of IC305 point B
Check the signal at Pin (16)
of IC310 point C
no
yes
no
yes
Check
IC305
Check LC302 and Q315
Q314
Check DL302
Check
IC310

SIGNAL FLOW CHART

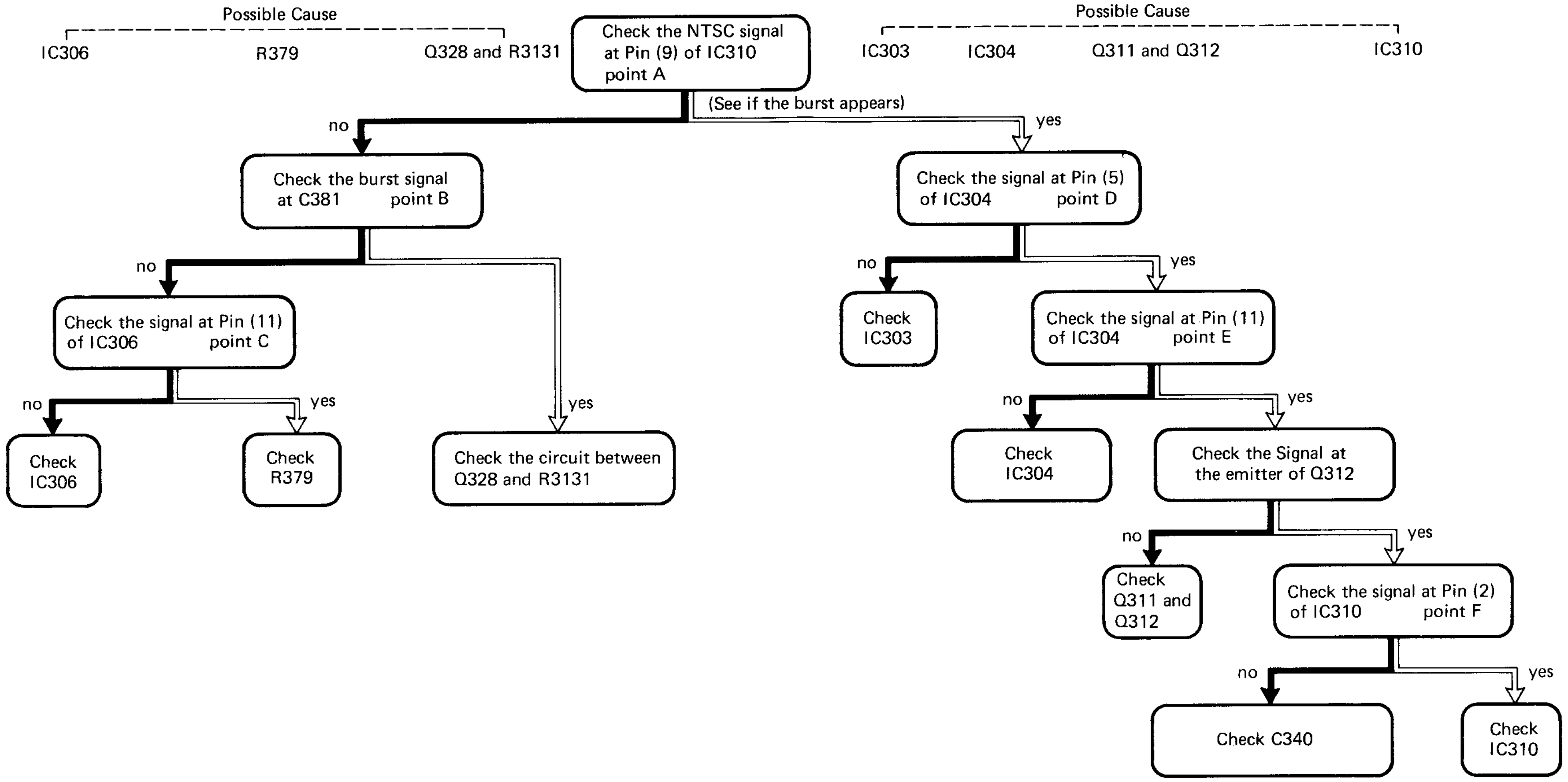

IC305
FROM
PRE-AMP
CIRCUIT
18
AMP
BLANKER
14
16
1
3
LC301
B
A
L.P.F.
(LC302)
Q315
Q314
DL302
C
IC310
16
17
18
1
AGC
CLAMP
MIX
9
2
5
7
NTSC
SIGNAL
OUT
CLAMP
PULSE
SYNC
SIGNAL
(CHROMINANCE CIRCUIT)
(CHROMINANCE
SIGNAL PATH)
(CHROMINANCE SIGNAL PATH)

CHROMINANCE SECTION

SERVICE FLOW CHART

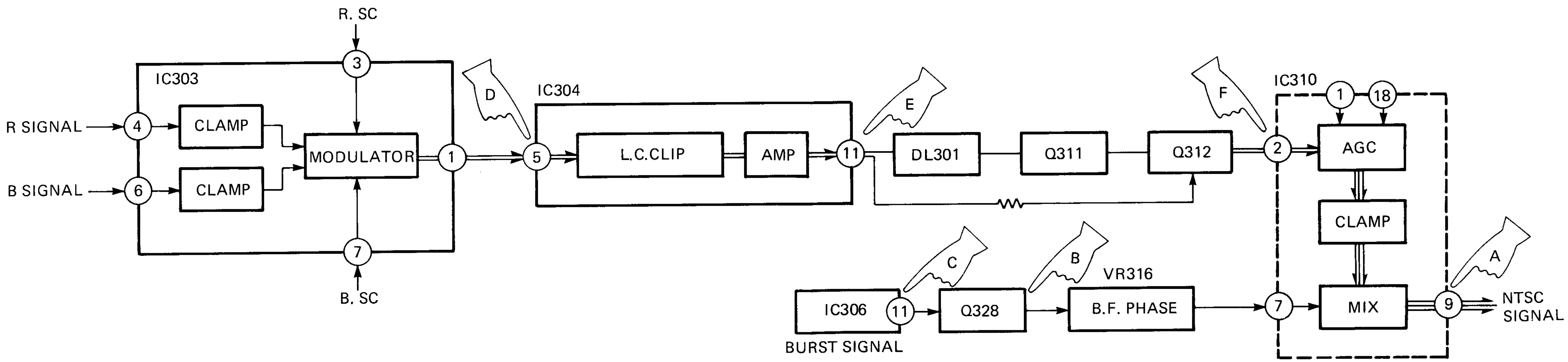
NO COLOR

If there is no color, Pin (9) of IC310 is the suggested place to start checking.
If there is signal at Pin (9) of IC310, follow the "Yes" path.
If no signal is present, follow the "No" path.



Possible Cause
IC306
R379
Q328 and R3131
Check the NTSC signal at Pin (9) of IC310 point A
(See if the burst appears)
Possible Cause
IC303
IC304
Q311 and Q312
IC310
no
yes
Check the burst signal at C381 point B
no
Check the signal at Pin (11) of IC306 point C
no
yes
Check IC306
Check R379
yes
Check the circuit between Q328 and R3131
Check the signal at Pin (5) of IC304 point D
no
yes
Check IC303
Check the signal at Pin (11) of IC304 point E
no
yes
Check IC304
Check the Signal at the emitter of Q312
no
yes
Check Q311 and Q312
Check the signal at Pin (2) of IC310 point F
no
yes
Check C340
Check IC310

SIGNAL FLOW CHART



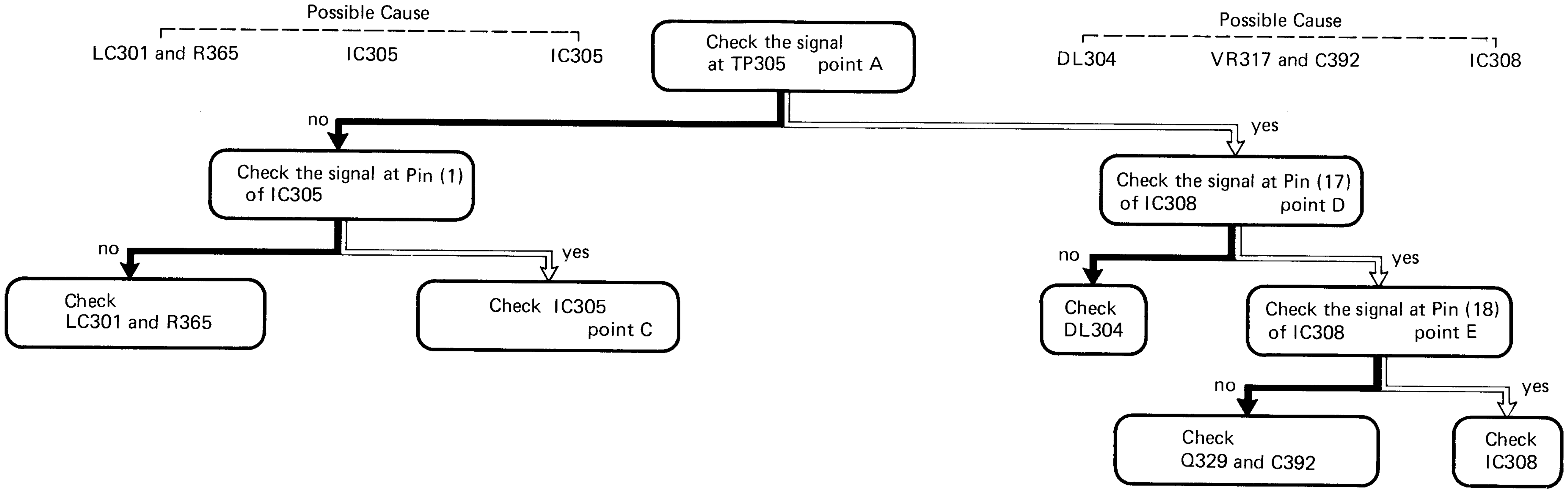
R. SC
IC303
3
R SIGNAL
4
CLAMP
MODULATOR
1
B SIGNAL
6
CLAMP
7
B. SC
D
IC304
5
L.C.CLIP
AMP
11
E
DL301
Q311
Q312
F
IC310
1
18
2
AGC
CLAMP
C
B
VR316
IC306
11
Q328
B.F. PHASE
7
MIX
9
A
NTSC SIGNAL
BURST SIGNAL

CHROMINANCE SECTION

SERVICE FLOW CHART

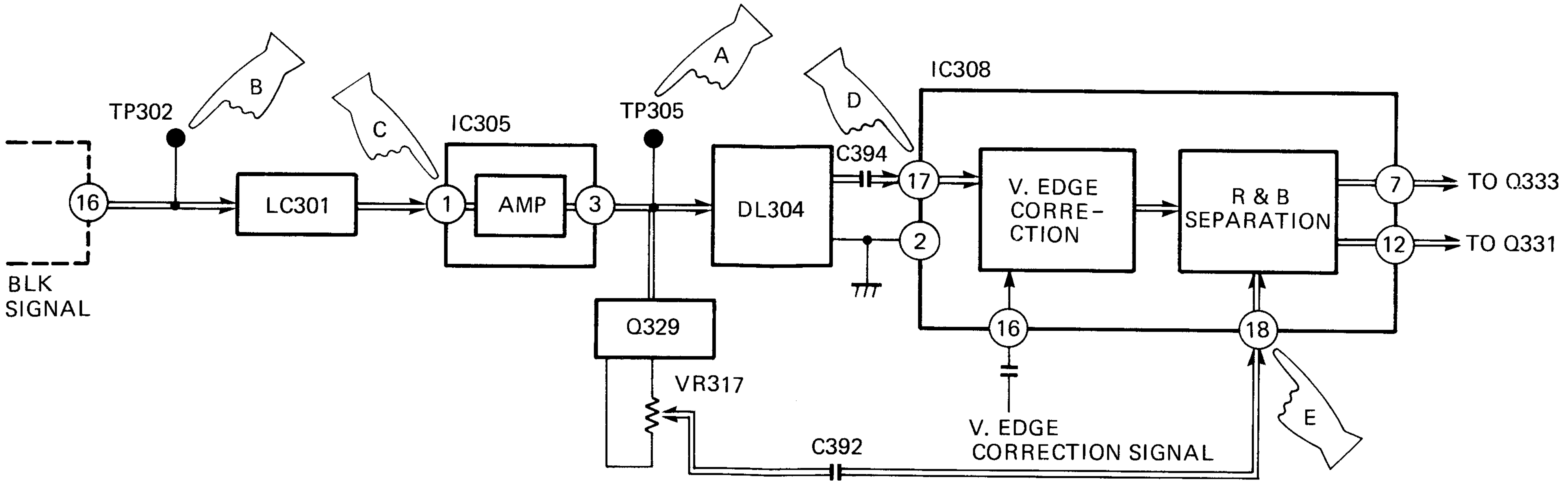
PICTURE TOO GREEN (Little or No Red and Blue)

If there is excessive green, Test Point TP305 is the suggested place to start checking.
If the signal is correct at TP305, follow the "Yes" path.
If the signal is not proper, follow the "No" path.


Possible Cause
LC301 and R365
IC305
IC305
Check the signal at TP305 point A
Possible Cause
DL304
VR317 and C392
IC308
no
yes
Check the signal at Pin (1) of IC305
no
yes
Check LC301 and R365
Check IC305 point C
Check the signal at Pin (17) of IC308 point D
no
yes
Check DL304
Check the signal at Pin (18) of IC308 point E
no
yes
Check Q329 and C392
Check IC308

Note: Before troubleshooting extensively, remember that focus, dynamic focus, beam alignment, gain and B gain all affect the amount and flatness of the red and blue signals, also YL pedestal (VR307) affect the YL signal amount. Therefore, those adjustments make the picture have a green tint or green areas. Please check them if it seem to be misadjustment rather that component failure. Refer to the service manual adjustment procedure.

SIGNAL FLOW CHART

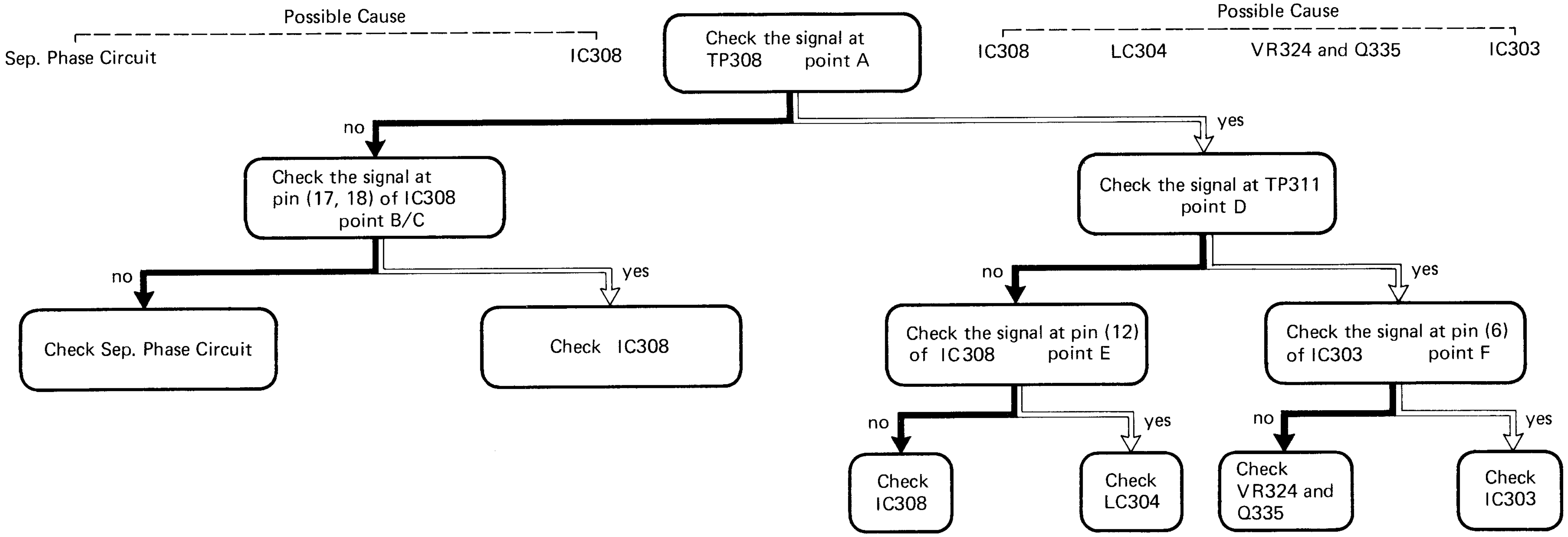

B
C
A
D
E
TP302
IC305
TP305
IC308
C394
16
LC301
1
AMP
3
DL304
17
2
V. EDGE CORRE-CTION
R & B SEPARATION
7
12
TO Q333
TO Q331
BLK SIGNAL
Q329
16
18
VR317
C392
V. EDGE CORRECTION SIGNAL

CHROMINANCE SECTION

SERVICE FLOW CHART

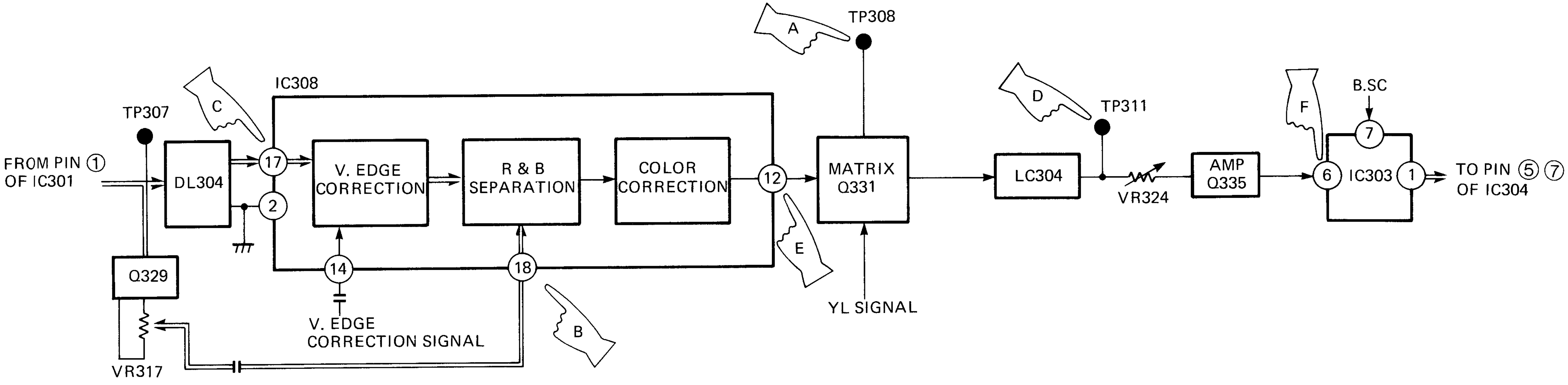
BLUE CHANNEL DEFECTIVE
(Too Much/Too Little Red)

If there is insufficient or excessive Blue, Test Point TP308 is the suggested place to start checking.
If the signal is correct at TP308, follow the "Yes" path.
If the signal is not proper, follow the "No" path.



Possible Cause
Sep. Phase Circuit
IC308
Check the signal at TP308 point A
Possible Cause
IC308
LC304
VR324 and Q335
IC303
no
yes
Check the signal at pin (17, 18) of IC308 point B/C
Check the signal at TP311 point D
no
yes
Check Sep. Phase Circuit
Check IC308
no
yes
Check the signal at pin (12) of IC308 point E
Check the signal at pin (6) of IC303 point F
no
yes
no
yes
Check IC308
Check LC304
Check VR324 and Q335
Check IC303

SIGNAL FLOW CHART

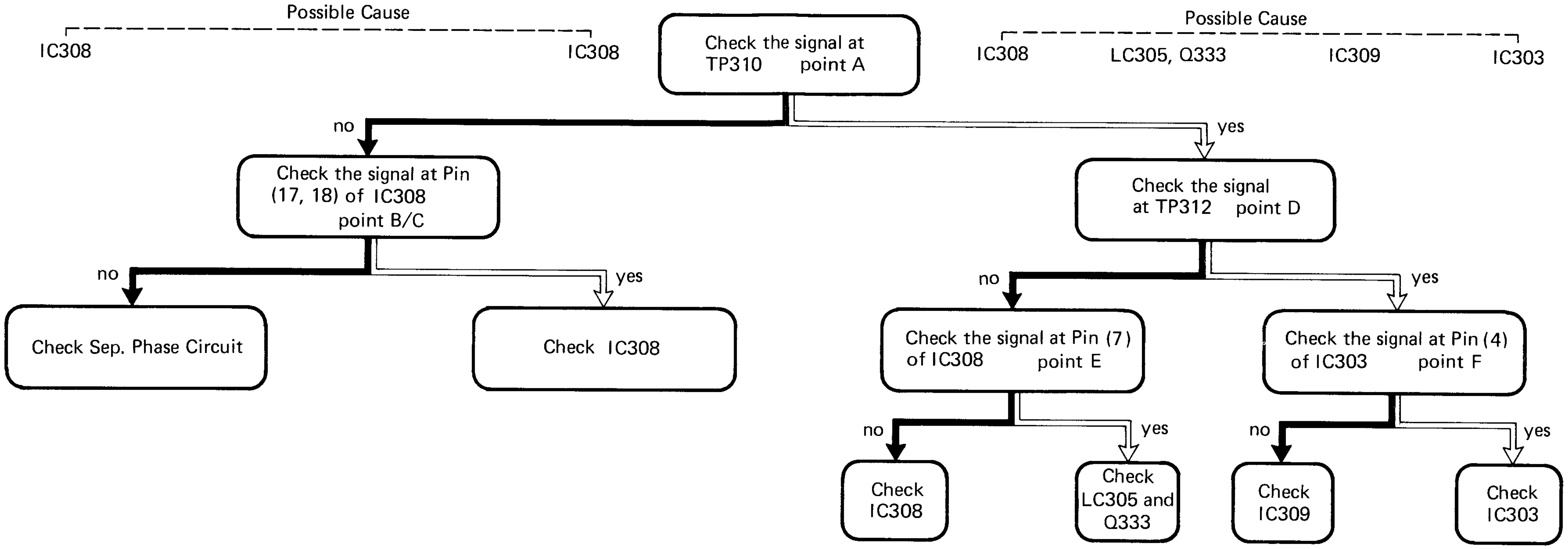


A
TP308
C
IC308
D
TP311
F
B.SC
TP307
FROM PIN ① OF IC301
DL304
17
2
V. EDGE CORRECTION
R & B SEPARATION
COLOR CORRECTION
12
MATRIX Q331
LC304
VR324
AMP Q335
6
IC303
1
7
TO PIN ⑤ ⑦ OF IC304
E
14
18
Q329
VR317
V. EDGE CORRECTION SIGNAL
B
YL SIGNAL

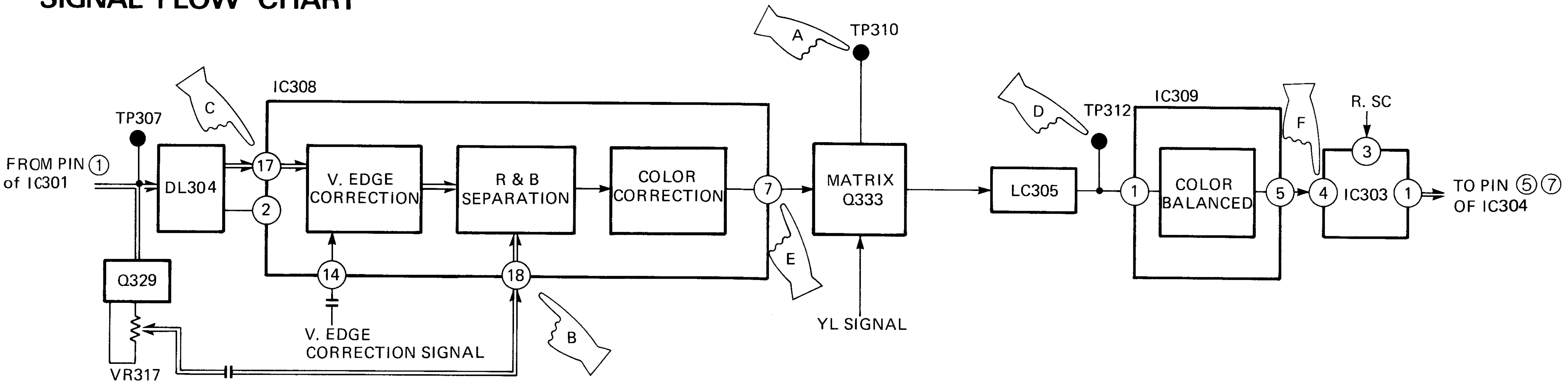
SERVICE FLOW CHART

RED CHANNEL DEFECTIVE (Too Much/Too Little Blue)

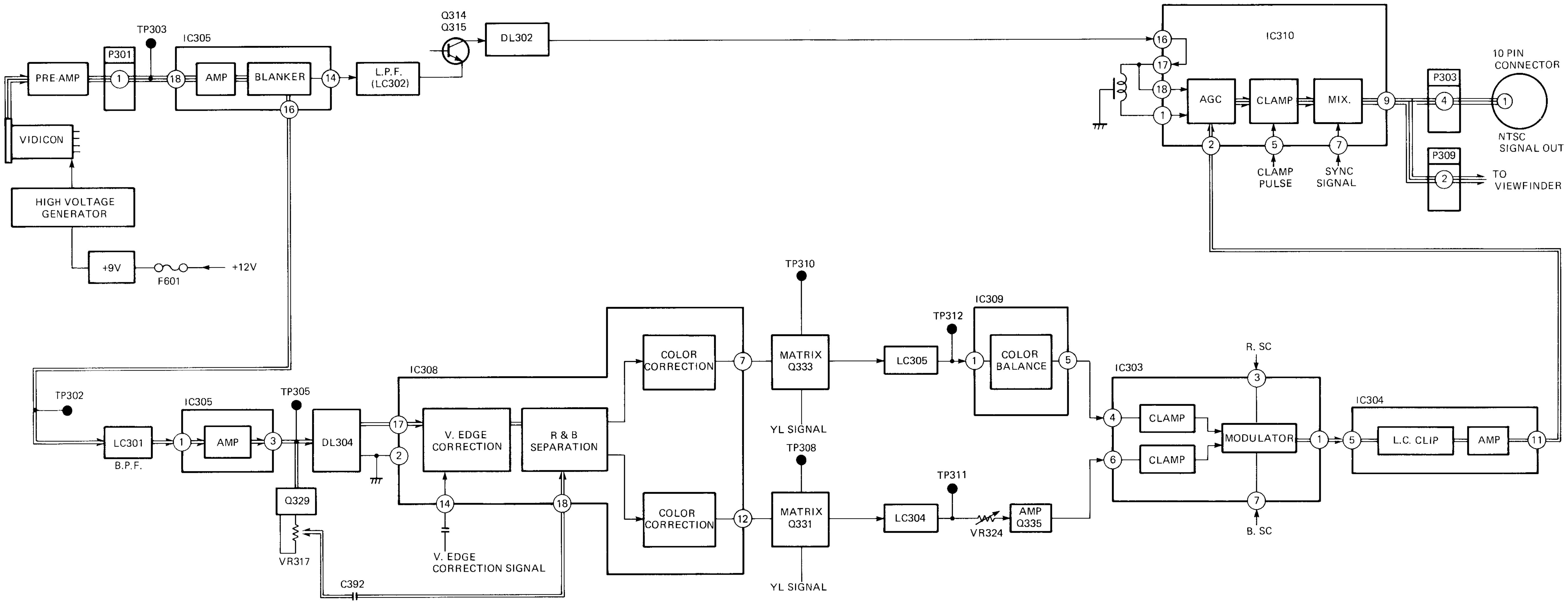
If there is insufficient or excessive red, Test Point TP310 is the suggested place to start checking.
If the signal is correct at TP310, follow the "Yes" path.
If the signal is not proper, follow the "No" path.


Possible Cause
IC308
IC308
Check the signal at TP310 point A
Possible Cause
IC308
LC305, Q333
IC309
IC303
no
yes
Check the signal at Pin (17, 18) of IC308 point B/C
Check the signal at TP312 point D
no
yes
no
yes
Check Sep. Phase Circuit
Check IC308
Check the signal at Pin (7) of IC308 point E
Check the signal at Pin (4) of IC303 point F
no
yes
no
yes
Check IC308
Check LC305 and Q333
Check IC309
Check IC303

SIGNAL FLOW CHART


A
TP310
C
IC308
D
TP312
IC309
F
R. SC
TP307
FROM PIN ① of IC301
DL304
17
2
V. EDGE CORRECTION
R & B SEPARATION
COLOR CORRECTION
7
MATRIX Q333
LC305
1
COLOR BALANCED
5
4
IC303
3
1
TO PIN ⑤⑦ OF IC304
E
Q329
14
18
B
V. EDGE CORRECTION SIGNAL
YL SIGNAL
VR317

SIMPLIFIED OVERALL FLOW CHART


TP303
IC305
P301
PRE-AMP
AMP
BLANKER
1
18
14
16
L.P.F.
(LC302)
Q314
Q315
DL302
VIDICON
HIGH VOLTAGE
GENERATOR
+9V
F601
+12V
IC310
16
17
18
1
AGC
CLAMP
MIX.
9
2
5
7
CLAMP
PULSE
SYNC
SIGNAL
P303
4
1
10 PIN
CONNECTOR
NTSC
SIGNAL OUT
P309
2
TO
VIEWFINDER
TP302
LC301
B.P.F.
IC305
1
AMP
3
TP305
Q329
VR317
DL304
17
2
IC308
V. EDGE
CORRECTION
R & B
SEPARATION
14
18
V. EDGE
CORRECTION SIGNAL
C392
COLOR
CORRECTION
7
COLOR
CORRECTION
12
TP310
MATRIX
Q333
YL SIGNAL
TP308
MATRIX
Q331
YL SIGNAL
LC305
TP312
IC309
1
COLOR
BALANCE
5
LC304
TP311
VR324
AMP
Q335
IC303
R. SC
3
4
CLAMP
6
CLAMP
MODULATOR
1
7
B. SC
IC304
5
L.C. CLIP
AMP
11

TROUBLESHOOTING FOR ELECTRONIC VIEWFINDER CIRCUIT

Item	Symptom	Cause	Troubleshooting
1	One horizontal raster	Failure of the vertical deflection circuit.	Check → D902 → Q905 → IC901 Pin 5 → Deflection coil
2	No both vertical and horizontal synchronization	Failure of the sync separation circuit.	Check → input video signal → Q903
3	No vertical synchronization.	•Failure of the integrate circuit. •Failure of the vertical oscillation circuit.	Check Integrate circuit R925, C914 → Q905
4	No horizontal synchronization.	•Failure of the AFC circuit. •Failure of the horizontal oscillation circuit.	Check → D903 , D904 → D905 , D906 , D907
5	Vertical return scanning is appeared.	Failure of the elimination circuit for return scanning.	Check → D901 → Q904
6	No raster	•Failure of the high voltage circuit. •Failure of the horizontal deflection circuit. •Failure of brightness control circuit.	Check → D907 → D908 → G3 voltage G2 voltage G1 voltage → Q906 → Q907 → Q908 → Adjust VR904 for brightness control.
7	No picture , but raster appears.	Failure of the video amplifier circuit.	Check → Q901 , Q902
8	No indicator	Failure of the indicator circuit.	Check → D911 , D910

ABBREVIATIONS USED IN THIS MANUAL

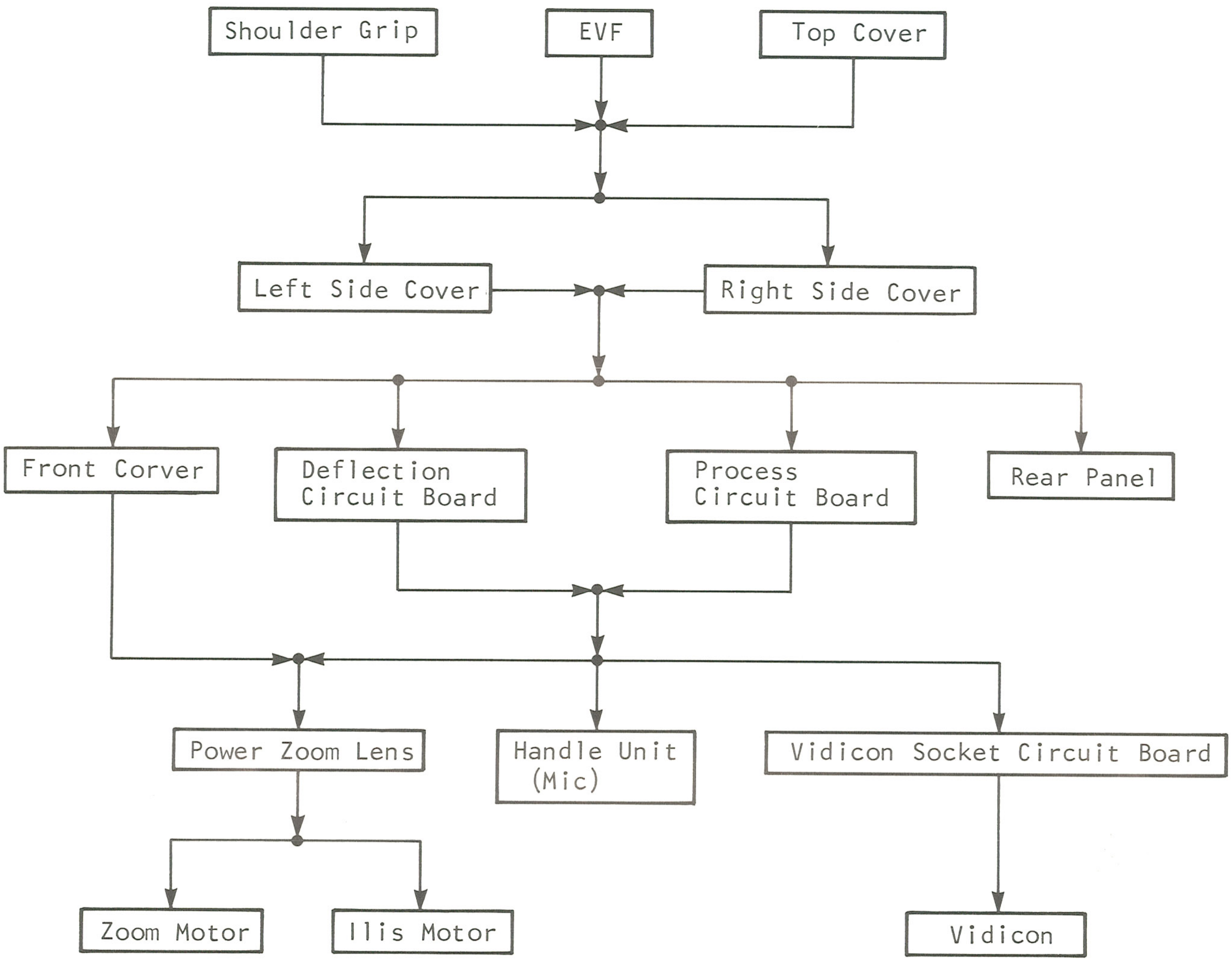
ADJ : Adjustment
Adj. : Adjustment
AFC : Automatic Frequency Control
AGC : Automatic Gain Control
AMP. : Amplifier
AWC : Automatic white Balance Control
B : Blue
BAL Balance
B.F.P. : Burst Flag Pulse
BLK : Blanking
BPF : Band Pass Filter
BSC : Blue Sub Carrier
C : Close
CB : Composite Blanking
CBA : Circuit Board Assembly.
CP-1 : Clamping Pulse 1
CP-2 ; Clamping Pulse 2
CRT : Cathode Ray Tube
CS : Composite Sync
DEF : Deflection
DET : Detector
DIFF AMP : Differential Amplifier
DL : Delay Line
DY : Deflection Yoke
ELIM : Elimination
EVF : Electronic View Finder
FBT : Fly Back Transformer
FET : Field Effect Transistor
FH : 15.75 KHz Horizontal Drive Pulse Frequency
G : Green
GB : Gated Burst Signal
GEN : Generator
H : Horizontal
HCC : High Chrominance Clip
HD : Horizontal Drive Pulse
Hd : Horizontal Drive Pulse (Delayed HD)
HP : Horizontal Parabola Waveform
Hs : Horizontal Saw-tooth Waveform
HSS : Horizontal Scanning Start Pulse
LCC : Low Chrominance Clip
LIN : Linearity
LPF : Low Pass Filter
LVL : Level
MOD : Modulation
OB : Optical Black
OSC : Osillator
OVF : Optical View Finder
PCB : Printed Circuit Board
PED : Pedestal
R : Red
REMO. CON. : Remote Control
RSC : Red Sub Carrier
SC1 : 0° Phase Sub Carrier
SC2 : 90° Phase Sub Carrier
SD : Shading Correction
SEPA. : Separation
TEMP. : Temperature
V : Vertical
VD : Vertical Drive Pulse
VP : Vertical Parabola Waveform
VS : Vertical Saw-tooth Waveform
VSS : Vertical Scanning Start Pulse
WBLK : Wide Blanking Pulse
YE : Edge Correction Input Signal
YH : Luminance Signal
YL : Low Band Luminance Signal

ADJUSTMENT PROCEDURES

Disassembly Method

Caution: Camera Service must be performed in a dust free location to maintain clean lens elements.

1. DISASSEMBLY FLOW CHART


Shoulder Grip
EVF
Top Cover
Left Side Cover
Right Side Cover
Front Corver
Deflection Circuit Board
Process Circuit Board
Rear Panel
Power Zoom Lens
Handle Unit (Mic)
Vidicon Socket Circuit Board
Zoom Motor
Ilis Motor
Vidicon

2. DETAILED DISASSEMBLY METHOD

2-1. Removal of Shoulder Grip
Unscrew 2 screws (A) and remove the shoulder grip.

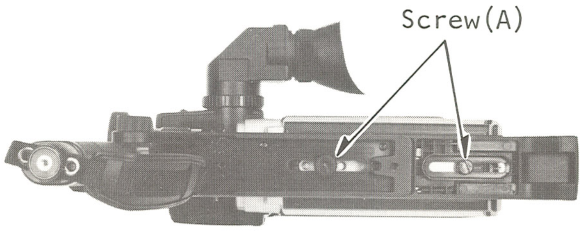


Fig.1 Bottom View

2-2. Removal of E.V.F Unit
Turn the handle knob (A), pull out the EVF cord and remove the EVF unit (see Fig.2).

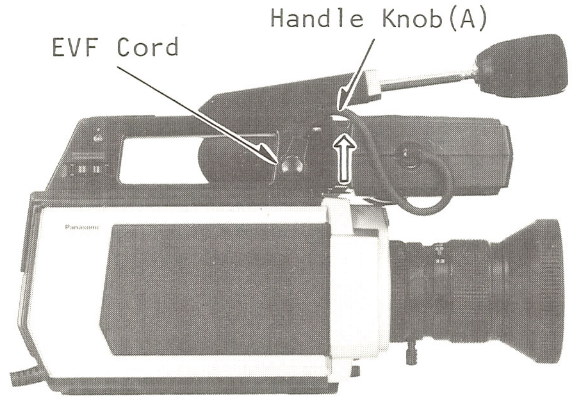
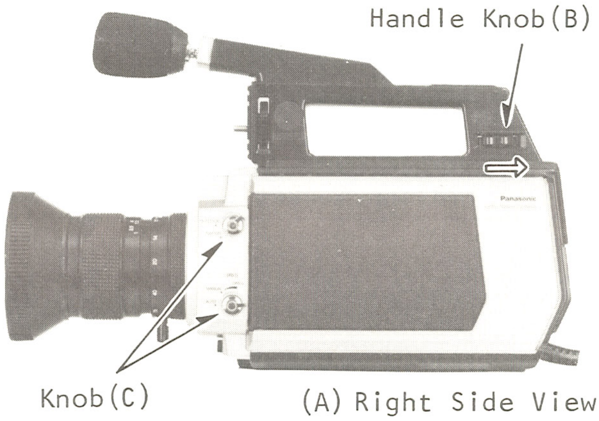
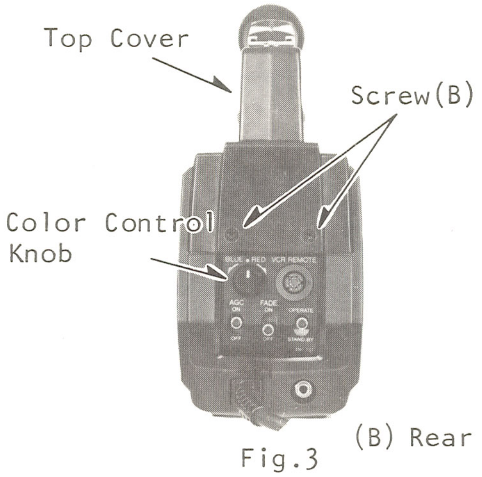

Handle Knob(A)
EVF Cord

Fig.2 Left Side View

2-3. Removal of Top Cover
Turn the handle knob (B), unscrew 2 screws (B) and remove the top cover (see Fig.3).


Handle Knob(B)
Knob(C)

(A) Right Side View


Top Cover
Screw(B)
Color Control
Knob

(B) Rear View

Fig.3

2-4. Pull off the color control knob (see Fig.3-B).

2-5. Pull off 2 knobs (C) (see Fig.3-A).

2-6. Removal of Right Side Cover
Unscrew 2 screws (C) and remove the right side cover (see Fig.4).

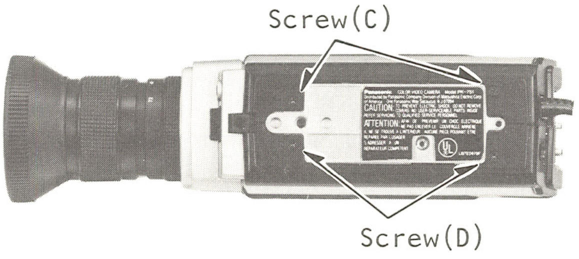
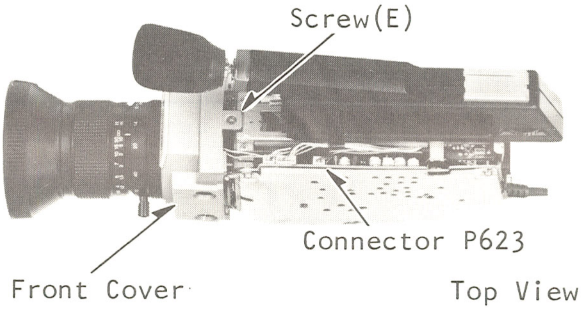

Screw(C)
Screw(D)

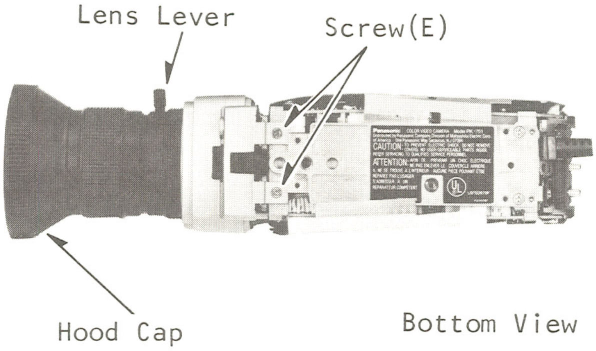
Fig.4 Bottom View

2-7. Removal of Left Side Cover
Unscrew 2 screws (D) and remove the left side cover (see Fig. 4).

2-8. Removal of Front Cover
a. Unscrew 3 screws (E) and disconnect a connector P623 (see Fig.5).


Screw(E)
Connector P623
Front Cover

Top View


Lens Lever
Screw(E)
Hood Cap

Bottom View

Fig.5

b. Unscrew the lens lever and remove the hood cap (see Fig. 5).

c. Remove the front cover ass'y.

2-9. Opening of Deflection Circuit Board
Unscrew 2 screws (F) securing the circuit board to the chassis (see Fig.6).

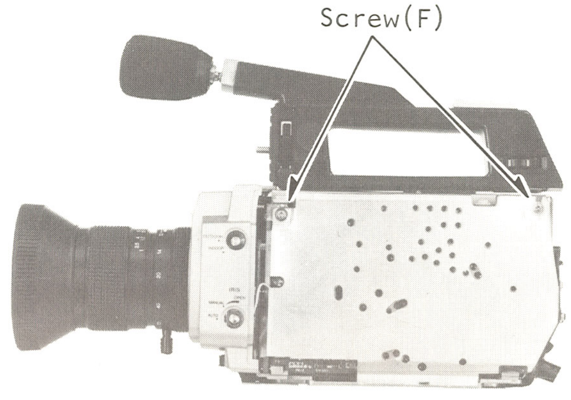


Fig.6 Right Side View

2-10. Opening of Process Circuit Board
Unscrew 2 screws (G) securing the circuit board to the chassis (see Fig.7).

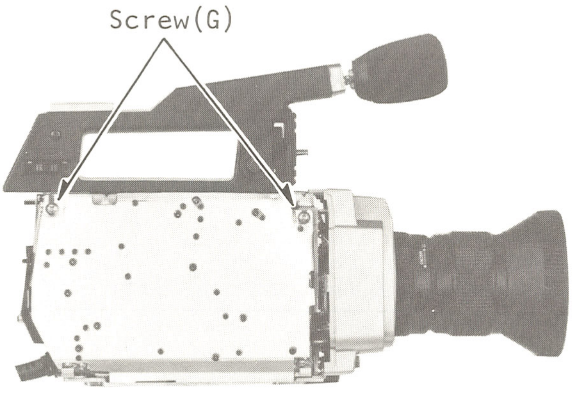


Fig.7 Left Side View

2-11. Removal of Handle Unit
Disconnect 4 connectors (P611, P616, P309 and P503) and remove the handle unit (see Fig.8).

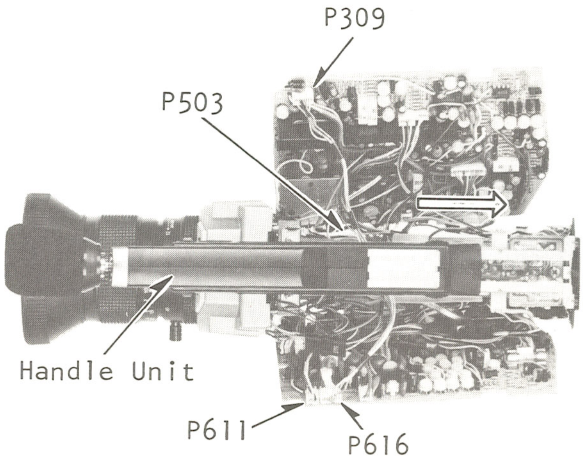

P309
P503
Handle Unit
P611
P616

Fig.8 Top View

3. REPLACEMENT OF THE VIDICON

3-1. Remove both side covers and open the process circuit and diflection circuit boards. (Refer to section "Disassembly Method".)

3-2. Remove the handle unit.

3-3. Unscrew 2 screws (A) and 2 screws (B) (see Fig.9).

3-4. Unsolder and remove a ground lead and a capacitor (A) from the vidicon D.Y. assembly.

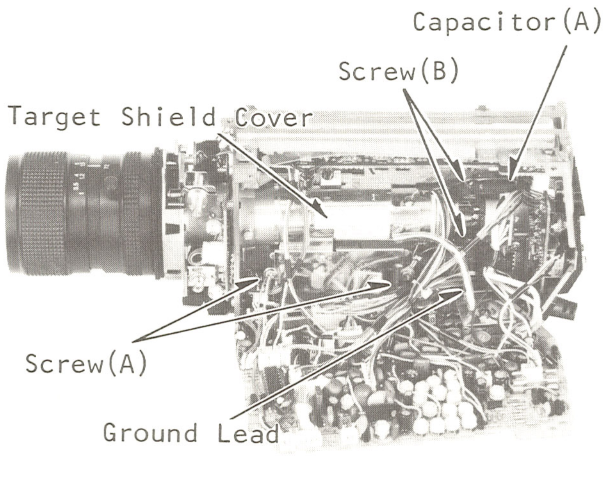

Capacitor(A)
Screw(B)
Target Shield Cover
Screw(A)
Ground Lead

Fig.9 Right Side View

3-5. Unsolder and remove the target shield cover (see Fig.9).

3-6. Unsolder and remove a white lead from the preamp. circuit board (see Fig.10).

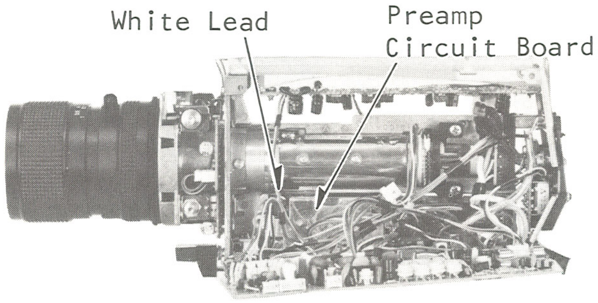

White Lead
Preamp Circuit Board

Fig.10 Right Side View

3-7. Remove the vidicon socket circuit board from the vidicon (see Fig.11).

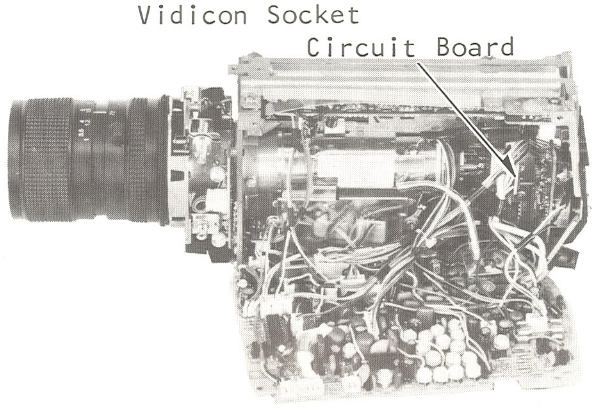

Vidicon Socket Circuit Board

Fig.11 Right Side View

3-8. Disconnect the connector P602 and remove the vidicon D.Y. assembly.

3-9. Remove the filter fixture assembly and the D.Y. holder (A)/(B) (see Fig.12).

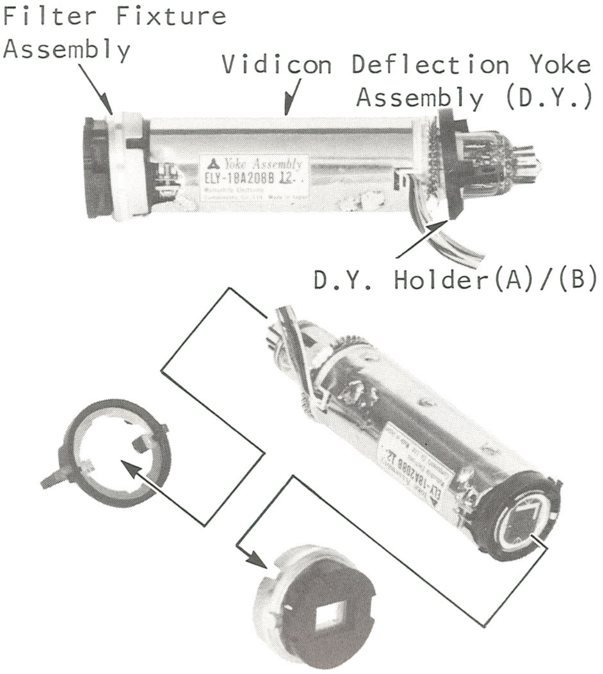

Filter Fixture Assembly
Vidicon Deflection Yoke Assembly (D.Y.)
Yoke Assembly
ELY-18A208B 12
D.Y. Holder(A)/(B)

Fig.12 Vidicon D.Y. Assembly

3-10. Loosen the clamp screw and remove the vidicon from the deflection yoke assembly (D.Y.) (see Fig.13).

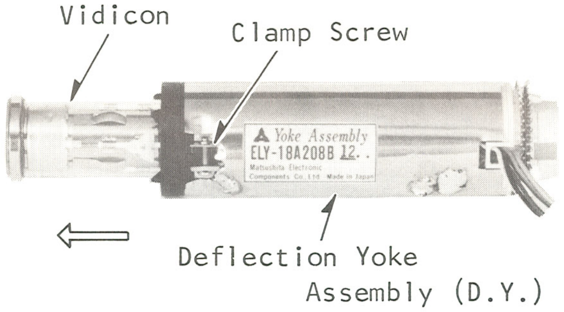

Vidicon
Clamp Screw
Yoke Assembly
ELY-18A208B 12
Deflection Yoke Assembly (D.Y.)

Fig.13 Vidicon and D.Y.

3-11. Install the new vidicon (S4094) in the deflection yoke assembly as shown in Fig. 14.

Note: Make sure vidicon's faceplate is clean before reinstalling.
To reinstall vidicon, reverse the previous steps.

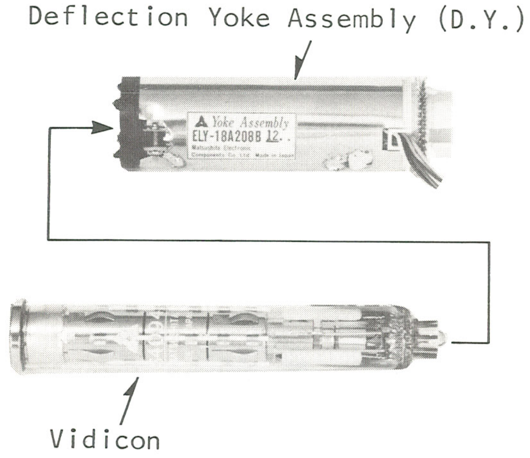

Deflection Yoke Assembly (D.Y.)
Yoke Assembly
ELY-18A208B 12
Vidicon

Fig.14 Vidicon and D.Y.

3-12. Line up the plastic tab on the D.Y. assembly with the small arrows on the face of the vidicon. The optical black stripe (inverted silver "L") should be on the right as shown in Fig. 15.

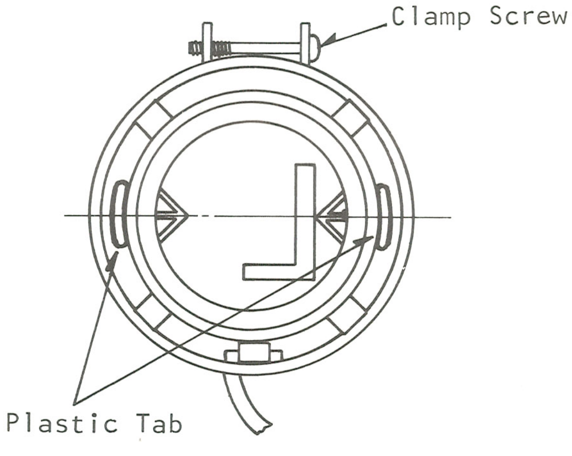

Clamp Screw
Plastic Tab

Fig.15

3-13. Push the vidicon in the D.Y. ass'y as far as it will go...using lens cleaning tissue paper to keep the faceplate spotless (see Fig.16).

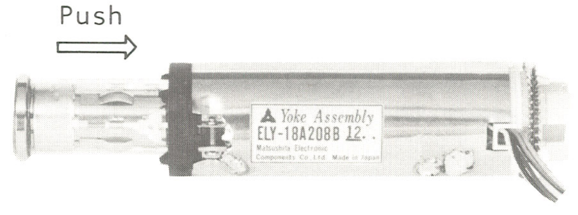

Push
Yoke Assembly
ELY-18A208B 12

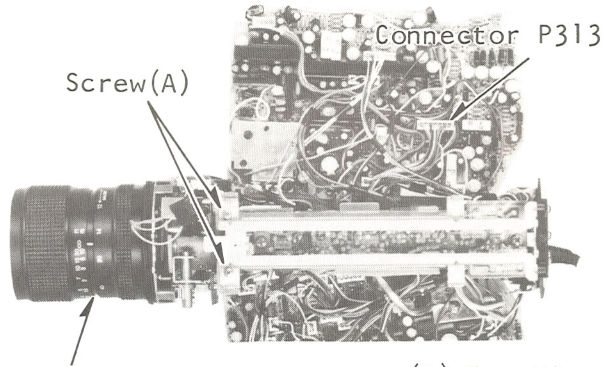
Fig.16

4. REPLACEMENT OF THE POWER ZOOM LENS

4-1. Remove the both side covers, the front cover and open the process circuit board and the deflection circuit board. (Refer to section "Disassembly Method".)

4-2. Disconnect a connector P313 from the process circuit board.

4-3. Unscrew 6 screws (A) and remove the lens assembly (see Fig.17-A/B).


Connector P313
Screw(A)
Lens

(A) Top View

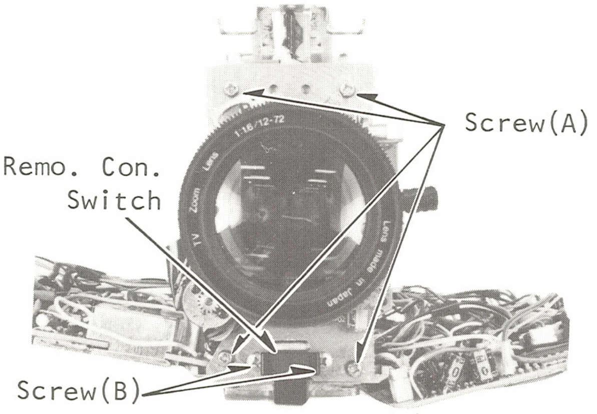

Screw(A)
Remo. Con. Switch
Screw(B)

Fig.17 (B) Front View

4-4. Unscrew 2 screws (B) and remove the remo. con. switch.

4-5. Install the new power zoom lens. ...using lens cleaning tissue paper to keep the lens spotless.

5. REPLACEMENT OF ZOOM MOTOR

5-1. Remove the power zoom lens. (Refer to section "Replacement of the power zoom lens".).

5-2. Unscrew 2 screws (A) and remove the zoom motor.

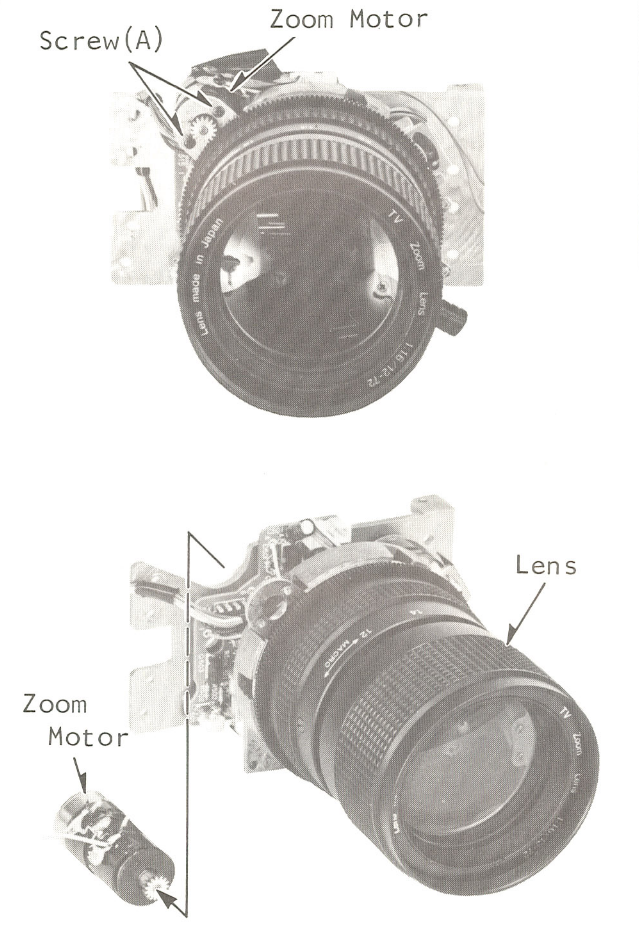

Screw(A)
Zoom Motor
Lens
Zoom Motor

Fig.18

5-3. Install the new zoom motor.

5-4. Before assembling the power zoom lens to the chassis, confirm that there is no spots on the lens surface.

6. REPLACEMENT OF IRIS MOTOR ASSEMBLY

6-1. Remove the power zoom lens. (Refer to section "Replacement of the power zoom lens".)

6-2. Unscrew 3 screws (A) and remove the lens from the chassis.

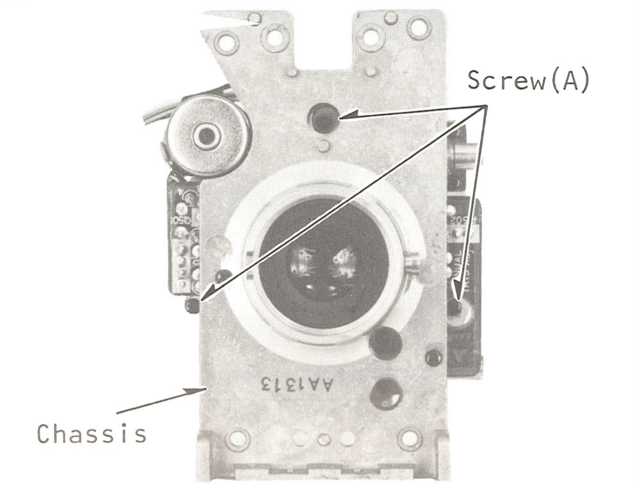

Screw(A)
Chassis

Fig.19

6-3. Unscrew 3 screws (B) and remove the iris motor ass'y.

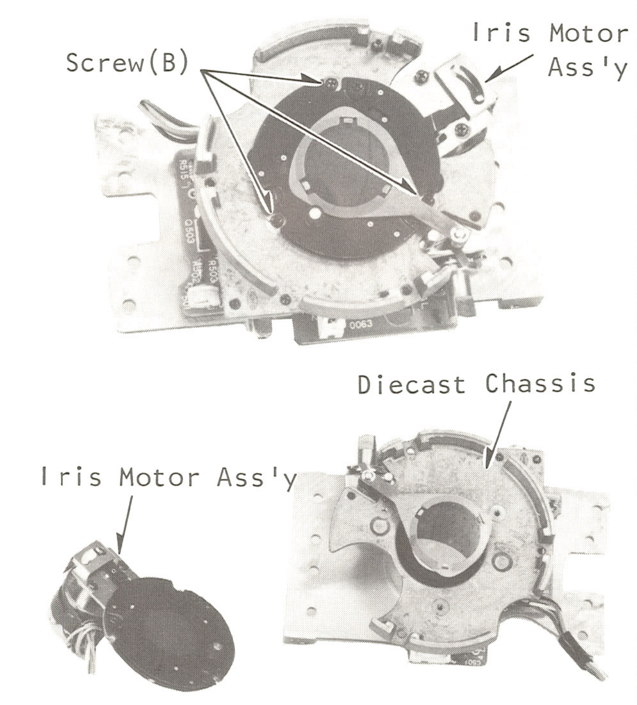

Screw(B)
Iris Motor Ass'y
Diecast Chassis
Iris Motor Ass'y

Fig.20

6-4. Install the new iris motor assembly. ...before assembling the iris motor ass'y to the diecast chassis, confirm that there is no spots on the lens surface and iris motor ass'y.

TEST EQUIPMENT LIST

1. Light Box w/Chart

Light Box w/Chart	Part Number	Reflection Chart	Part Number
Light Box w/Chart Set	VFKS002	Reflection Chart Set	VFKS003
Grayscale Chart	VFKS002A	Grayscale Chart	VFKS003A
Color Chart	VFKS002B	Color Chart	VFKS003B
Registration Chart	VFKS002C	Registration Chart	VFKS003C
Resolution Chart	VFKS002D	Resolution Chart	VFKS003D
Light Box	VFKS002Y	Color Sheet	VFKS003E

2. 3200°K Studio light (See your local photo supply dealer).
   Minimum requirement is 2 flood lights about 350-500 watts each.

3. Luxmeter
   We recommend one of the following:
   A. Portable luxmeter Model No. 3281 by Yokogawa
      Yokogawa Corporation of America
      5 Westchester Plaza Elmsford New York 10523

   B. Electronic Foot Candle Meter by Panlux
      Berkey Marketing Company
      25-30 Brooklyn Queens Expressway Woodside,
      New York 11377

4. FM Detector (*)
   Part No. -------- VFKS001

5. Under Scanned Color Monitor

6. Oscilloscope
   Dual Trace, 25mHz, 2mV/DIV.
   Minimum Sensitivity with Delay Mode.

7. Vector Scope

8. Signal Generator
   Sinewave 10 - 30 Hz

9. Video Sweep Generator

10. VTVM or Digital Voltmeter

11. Tripod

12. Frequency Counter

(*) ----- Available from panasonic Regional Division.

Electrical Adjustment Procedures

Preparations:
It is recommended to adjust the color camera after 30 minutes of warm up for optimum adjustments.

[1] +9V ADJUSTMENT

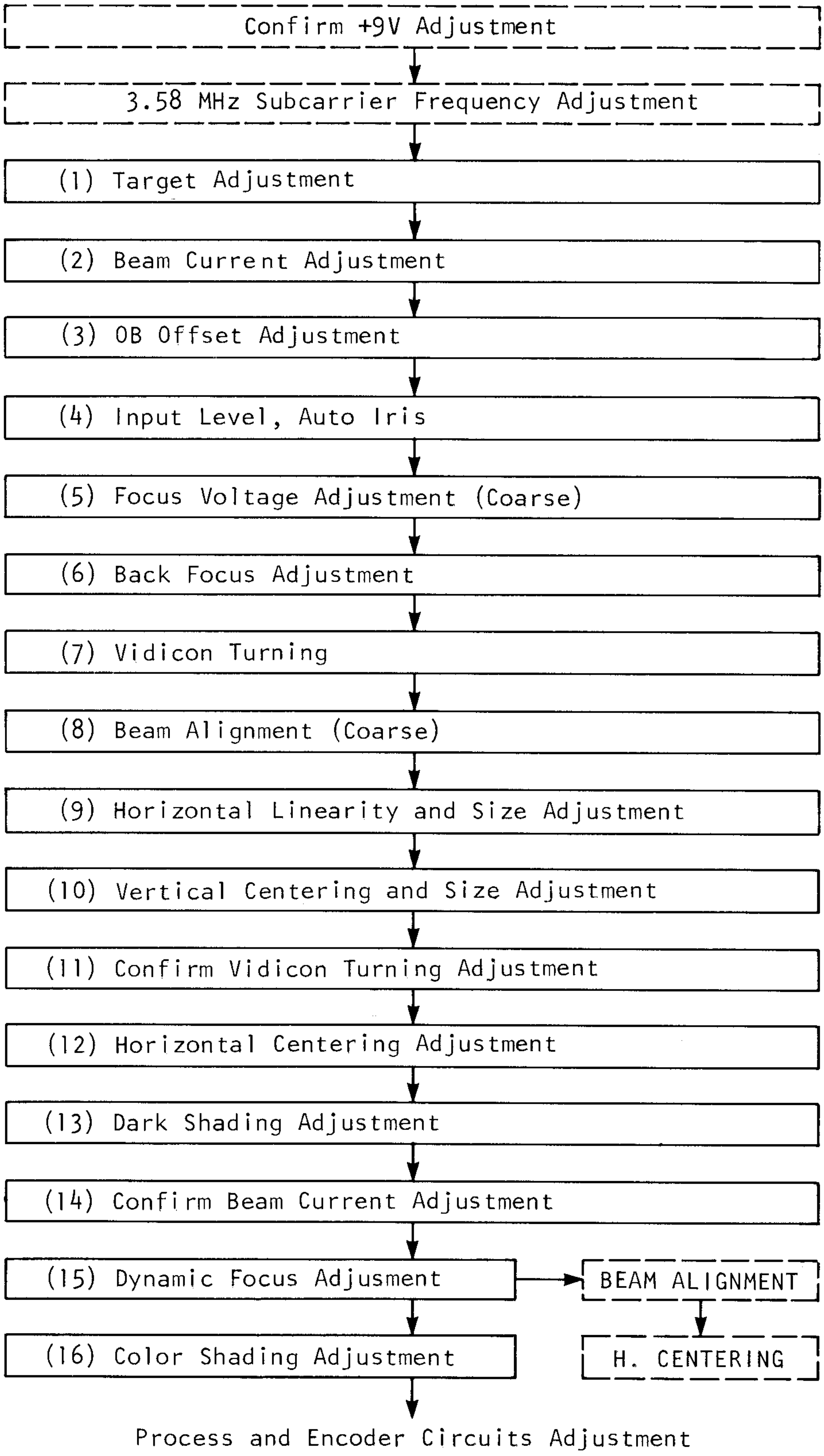
CAUTIONS:
Adjust +9V voltage before proceeding with the other camera adjustments. Do not adjust later in the procedure as it will affect overall adjustment.

If entire camera alignment is not to be performed, do not adjust +9V voltage unless the error is more than ±0.02 volt.

1. Observe the voltage at the +9V regulator at TP612 (Deflection Board) with a voltmeter, and adjust the voltage to +9V ±0.01 Volts with VR620.
2. If the +9V was misadjusted more than 0.5V, repeat Step 2 after 5 minutes.

[2] DEFLECTION CIRCUIT ADJUSTMENT

ADJUSTMENT FLOW CHART OF DEFLECTION CIRCUIT (BOARD)


Confirm +9V Adjustment
3.58 MHz Subcarrier Frequency Adjustment
(1) Target Adjustment
(2) Beam Current Adjustment
(3) OB Offset Adjustment
(4) Input Level, Auto Iris
(5) Focus Voltage Adjustment (Coarse)
(6) Back Focus Adjustment
(7) Vidicon Turning
(8) Beam Alignment (Coarse)
(9) Horizontal Linearity and Size Adjustment
(10) Vertical Centering and Size Adjustment
(11) Confirm Vidicon Turning Adjustment
(12) Horizontal Centering Adjustment
(13) Dark Shading Adjustment
(14) Confirm Beam Current Adjustment
(15) Dynamic Focus Adjusment
BEAM ALIGNMENT
H. CENTERING
(16) Color Shading Adjustment
Process and Encoder Circuits Adjustment

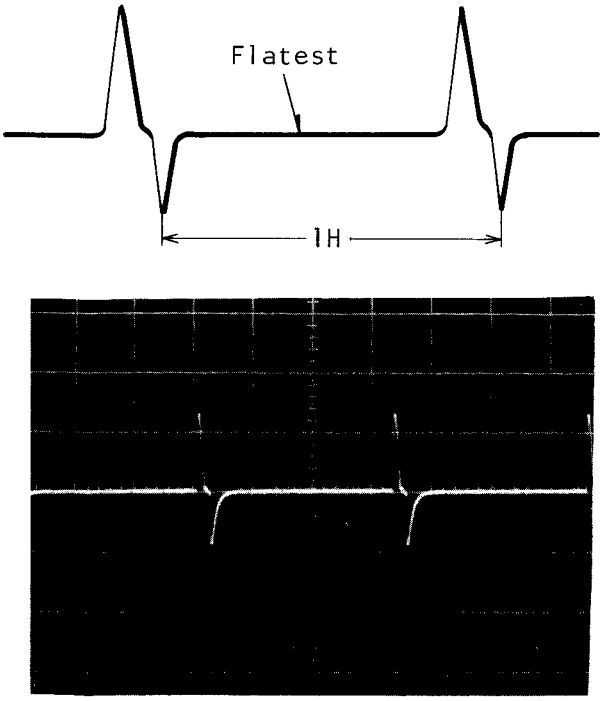
Preparation:

1. Preset the following:
   - a) Color Control Knob
     .....Center position (Detent position)
   - b) Auto/Manual Iris Control SW
     ....."Manual (close)" position
   - c) Color Temperature Correction SW
     ....."Indoor" position
   - d) AGC SW or LT. SENS SW
     ..... "ON" position or "+6dB" position
   - e) Standby SW
     ..... "Operate" position

2. Release the Dynamic Focus

Note: It's best to external trigger to TP608 for horizontal adjustments and TP605 for vertical adjustments flatests.

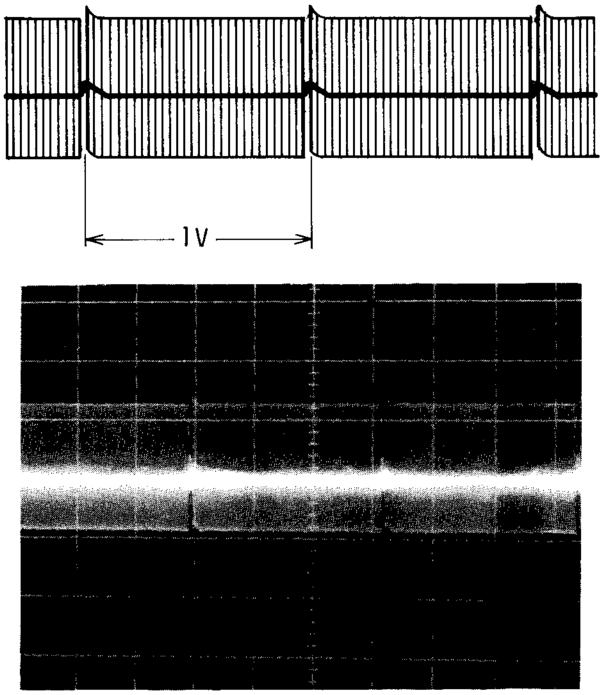
(a) Set iris control to close and observe the signal at H. rate at TP604 and adjust VR608 (H. Saw) and VR609 (H. Par) for the signal waveform to be flatest during horizontal period as shown in Fig. 1.



1V 20μsec

Fig.1

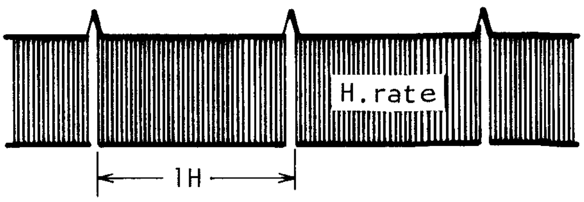
(b) Observe the signal at V. rate at TP604 and adjust VR610 and VR611 for the signal waveform to be flatest during vertical period as shown in Fig. 2.



1V 5msec

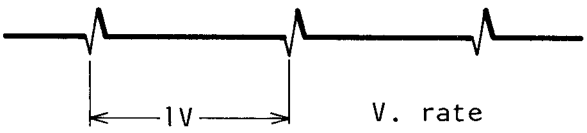
Fig.2

3. Release the color shading
   (a) Observe the signal at H. rate TP606 and adjust VR612 and VR613 for the signal waveform to be faltest during horizontal period as shown in Fig. 3.



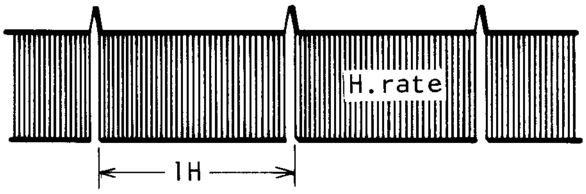
0.1V 20μsec Fig.3

(b) Observe the signal at V. rate at TP606 and adjust VR624 and VR627 for the signal waveform to be flatest during vertical period as shown in Fig. 4.



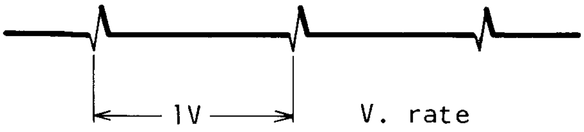
0.1V 5msec Fig.4

(c) Observe the signal at H. rate at TP607 and adjust VR614 and VR615 for the signal waveform to be flatest during horizontal period as shown in Fig. 5.



0.1V 20µsec Fig.5

(d) Observe the signal at V. rate at TP607 and adjust VR625 and VR626 for the signal waveform to be flatest during vertical period as shown in Fig. 6.



0.1V 5msec Fig.6

4. Adjust the 3.58 MHz sub-carrier frequency.

TP	Adj.	Chart	Test Instrument	Scope Trigger
Pin (7) of IC303 Sub-carrier	C357	/	Frequency Counter	/

(a) Measure the sub-carrier frequency with frequency counter.
(b) Adjust C357 for 3,579, 545 ± 50 Hz.

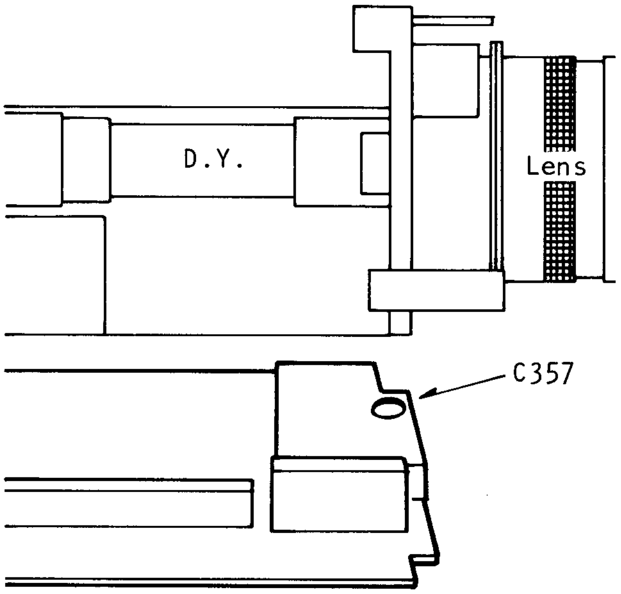


Fig.7

(1) TARGET ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP303	VR601	/	Scope	TP605 Vss

1. Set iris control to close and connect 1:1 probe to TP303 on process circuit.

Note:
Before making any adjustments, you must wait 5 minutes after closing the lens to allow-the dark current to stabilize.

2. Adjust VR601 (Target) for 30 mVp-p at the center of waveform.
   If there is excessive noise, use the following filter (Fig. 8) between TP303 and the scope's probe.

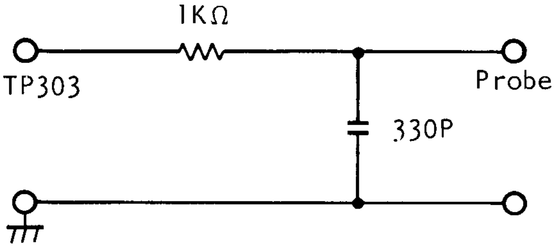
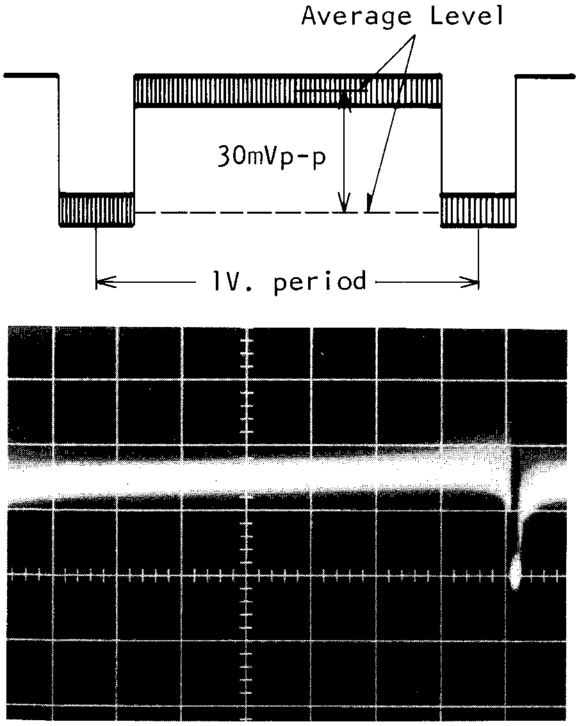


Fig.8 Filter Circuit



TP303 20mV/2msec.div.

Fig.9 Waveform Dark Current

3. Set iris control to auto.

(2) BEAM CURRENT ADJUSTMENT

Note: Set Auto/Manual Iris Conrol to "Auto".

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP303	VR605	White Light Box	Scope	TP605 Vss

1. Connect the scope probe to TP303 and observe the signal at V. rate.

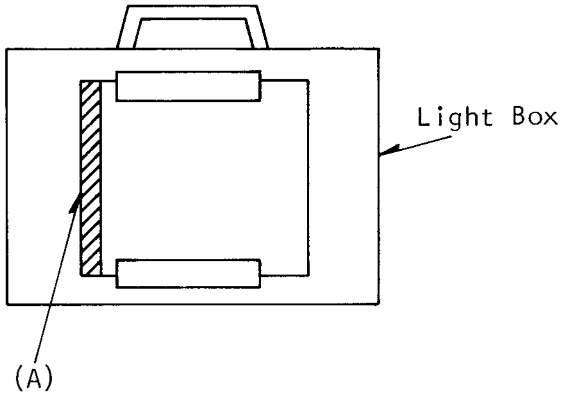


Fig.10

2. Aim camera at (A) portion of the light box Fig. 10 (or some other small light source) to make the beam saturated (waveform does not increase).
3. Adjust VR605 (Beam) for signal clipping at 1.8 Vp-p. If the signal is less than 1.8 Vp-p, use a more intense light.
   Watch out for vidicon burn!!
   (See Fig. 11)

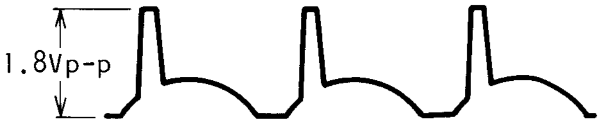


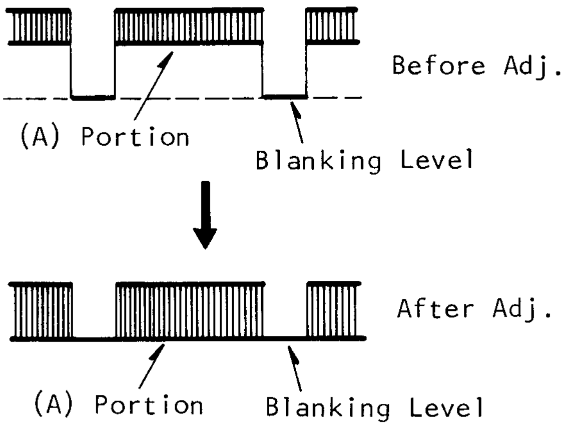
Fig.11

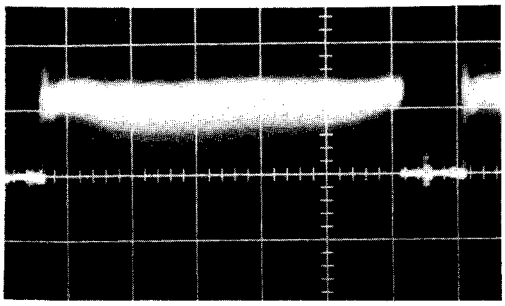
(3) OPTICAL BLACK OFFSET ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP304	VR306	/	Scope	TP608 Hss

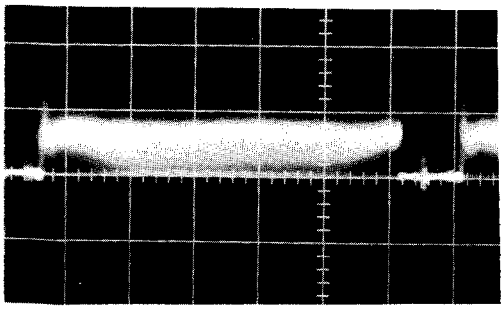
Note:
Set iris control to close and wait 5 minutes before making adjustment.

1. Connect the scope probe to TP304 and observe the signal at H. rate.
2. Adjust VR306 (OB Correct) so that (A) portion level of the signal is equal to blanking level.





Before 50mV/10msec.div.



After 50mV/10msec.div.

Fig.12

(4) INPUT LEVEL AND AUTO IRIS ADJUSTMENT

Note:

a. Steps 1,2,3 and 4 are only needed when the vidicon is replaced, or when the pre-amplifier board is replaced.

b. If reflection chart (gray scale) is used, a light intensity of 1400-2000 lux is required.

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP304	VR305 Input level VR501 Auto. Iris control	Gray Scale	Scope	TP608 Hss

1. Misadjust VR604 fully clockwise or counterclockwise.
2. Aim the camera at gray scale chart.
3. Connect the scope probe to TP304 and observe the signal at H. rate.
4. Adjust VR501 for a signal level of 800 mVp-p.
5. Then, connect the scope probe to TP303 and observe the signal at H. rate.
6. Adjust VR305 for a signal level of 550 mVp-p.
7. Confirm that the signal level, at TP304, is 800 mVp-p.
8. If necessary, readjust VR501.

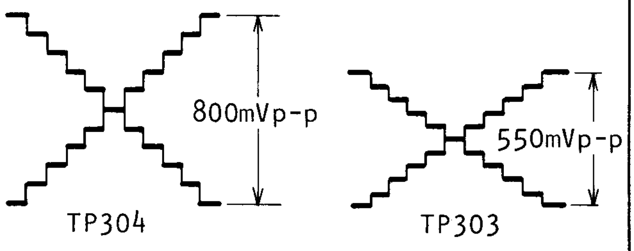


Fig.13

(5) FOCUS VOLTAGE ADJUSTMENT (COARSE)

1. Aim the camera at an evenly illuminated white surface (use 1500 lux. or Light Box) and focus the lens.

2. Adjust VR604 focus control for maximum magenta area and minimum green area in the monitor picture.

(6) BACK FOCUS ADJUSTMENT

1. Aim the camera at a distant object more than 10 meters (33 ft) and zoom in completely (maximum close up).
2. Focus the lens.
3. Loosen the hex screw holding the relay lens as shown in Fig. 14.

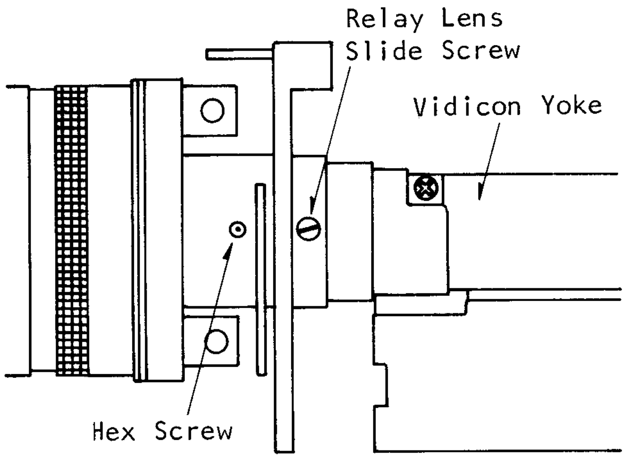


Fig.14 Deflection Yoke View

4. Zoom out (widen the field of view) and adjust the relay lens slide screw using a screw driver until best focus is obtained.
5. Repeat-steps 1, 2 and 4 until best focus is obtained over the entire zoom range of lens.
6. Tighten the hex screw loosened in step 3.
   DO NOT OVER TIGHTEN ... Lens assembly or housing may crack.

(7) VIDICON TURNING (ADJUSTMENT OF VIDICON POSITION)

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP305 3.58 MHz Carrier	VR604/ Vidicon Turning	White	Scope	TP605 Vss

1. Aim the camera at white chart or white screen.
2. Connect the scope to TP305 and observe the 3.58 MHz carrier signal at V. rate.
3. Adjust VR604 for the signal to be maximum level as shown in Fig. 15.

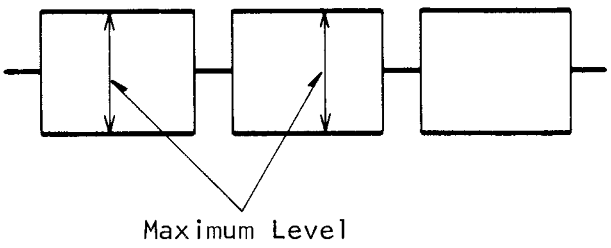


Fig.15

4. Using delayed sweep on the center of the V signal waveform, observe a few horizontal lines.
5. Loosen the vidicon clamp screw on deflection yoke assembly as shown in Fig. 16.

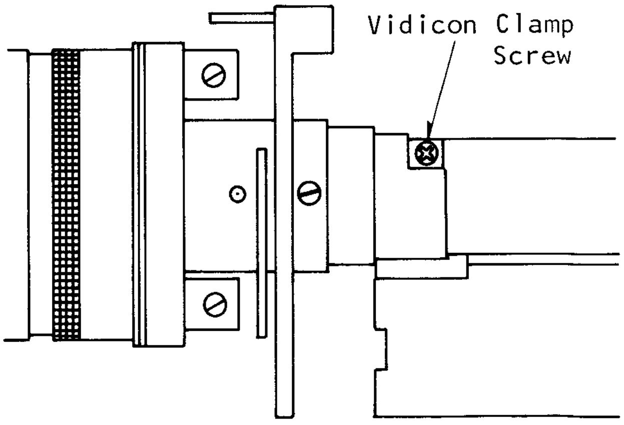


Fig.16 Deflection Yoke view

6. Now rotate the vidicon from the back so that the waveform is without beat or ripple, for each H scan line. (Be careful when making this adjustment due to high voltage on the connector of vidicon.) Amplitude differences may be expected. (See Fig. 17)

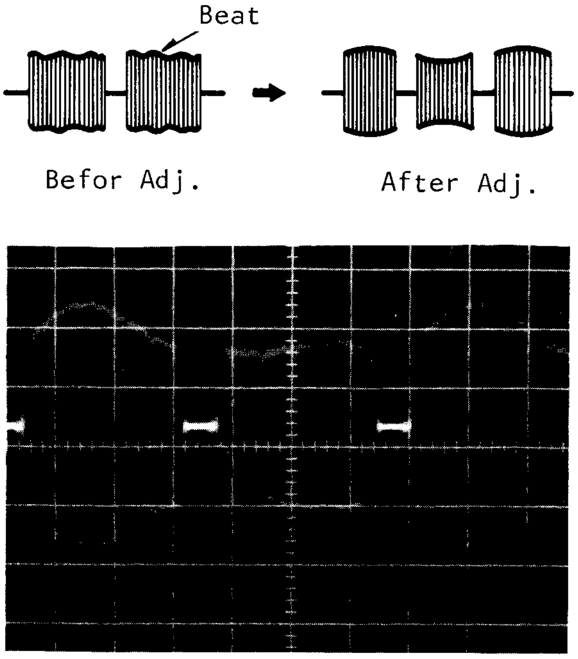


Fig.17 Photograph of proger Vidicon Turning

7. Tighten the vidicon clamp screw. This is only a coarse adjustment. It will be repeated.

(8) BEAM ALIGNMENT (COARSE)

TP	Adj.	Chart	Test Instrument	Scope Trigger
/	Two Alignment Rings	White	Color Monitor	/

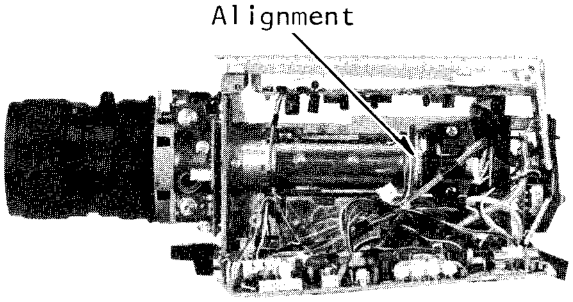


Fig.18 (A)

1. Aim the camera at white chart or white screen and turn the color control knob clockwise.
2. Observe the raster on monitor and adjust the two alignment rings (see Fig. 18-A) so that the magenta color covers on the whole screen as shown in Fig. 18-B.

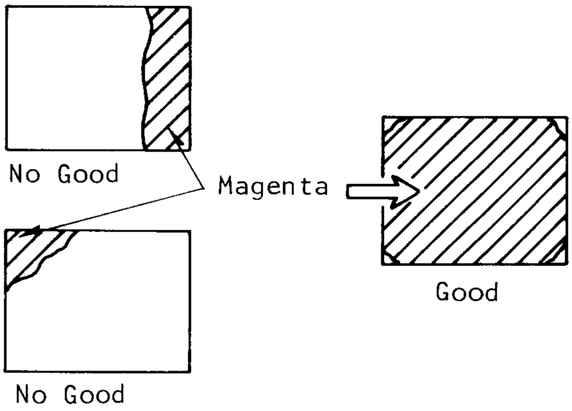


Fig.18 (B) TV Screen

3. Turn the color control knob to center portion.

(9) HORIZONTAL LINEARITY AND SIZE ADJ.

Process Board/deflection board.

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP305 3.58 MHz Carrier Composite Blanking	VR616 H. Size VR618 H. Lin (1) VR619 H. Lin (2)	White	Scope FM Detector (VFKS001)	TP608 Hss

1. Check and readjust Focus (VR604) if necessary.
2. Turn the FM Detector knob to Horizontal Size and Lin. position and the rear switch to 3.58 MHz position as shown in Fig. 19.

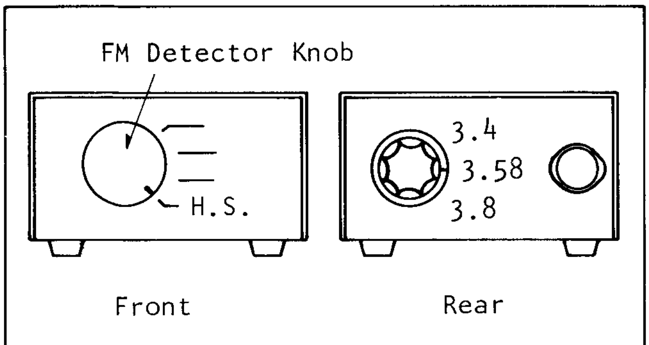

FM Detector Knob
H.S.
3.4
3.58
3.8
Front
Rear

Fig.19 FM Detector

3. Connect FM Detector (VFKS001) as shown in Fig. 20.

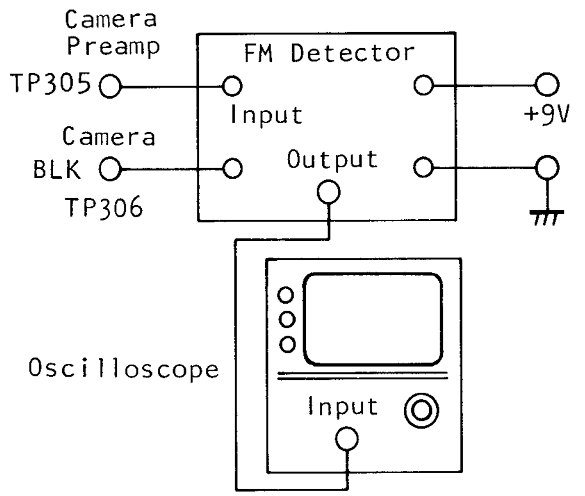

Camera Preamp
TP305
Camera BLK
TP306
FM Detector
Input
Output
+9V
Oscilloscope
Input

Fig.20 Connection of FM Detector

4. Adjust H. Size (VR616) so that the signal is centered on the Blanking Line, as shown in Fig. 21.

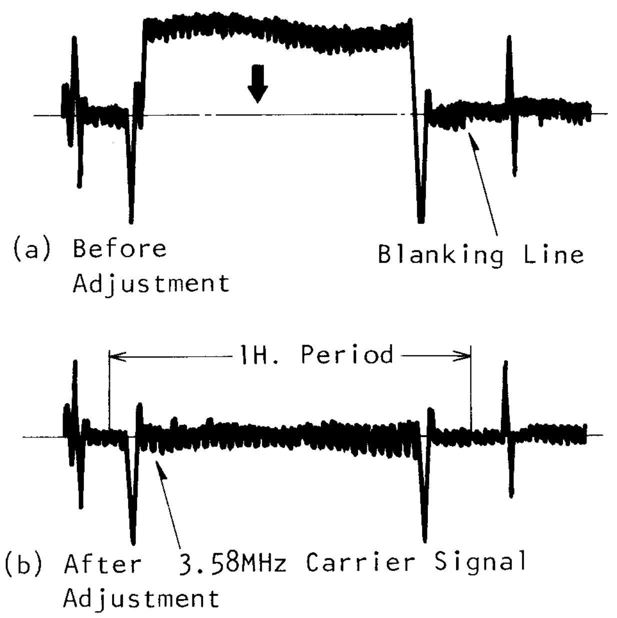


Fig.21 Waveform of proper Adjustment

5. Adjust H. Lin. (1), VR618, and H. Lin. (2), VR619 so that the waveform on the scope is as flat as possible (see above figure (b)). H. Lin. (1) controls H. Sweep on the left side of the picture. H. Lin. (2) controls overall linearity.

(10) VERTICAL CENTERING AND VERTICAL SIZE ADJUSTMENT

A. Method 1 - coarse

TP	Adj.	Chart	Test Instrument	Scope Trigger
/	VR602 V. Size VR603 V. Cent.	Ball Chart	Under Scanned Monitor	/

Note:
If ball chart is not available, use METHOD 2 only.

1. Aim the camera at the registration chart placing it in the center of the under scanned monitor, so that the side arrows just touch the side of the raster.
2. Adjust V. Size control VR602 so that the top and bottom arrows just touch the ends of the raster (you may have to tilt the camera to achieve this adjustment), see Fig. 22.

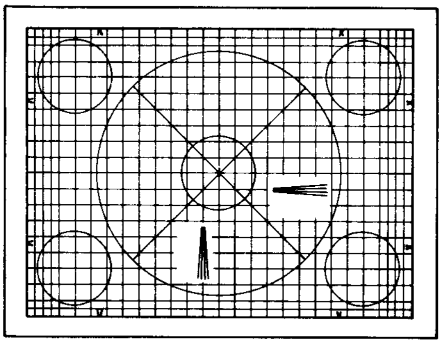


Fig.22 Under Scanned Monitor

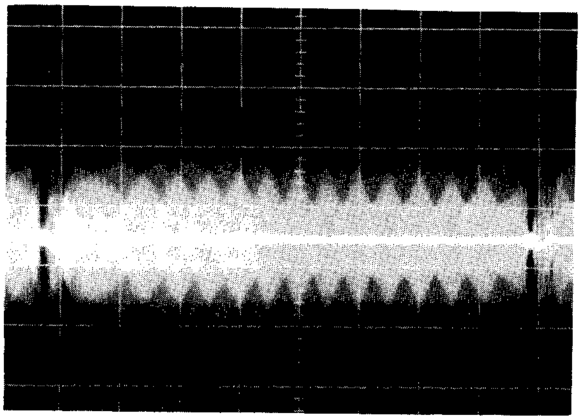
3. Note the position of the center cross on ball chart and zoom out.
4. Adjust V. center VR603 so that the cross does not shift vertically as you zoom in and out.
5. Proceed to item 11.

B. Method 2-Fine Adjustment(V. Size)

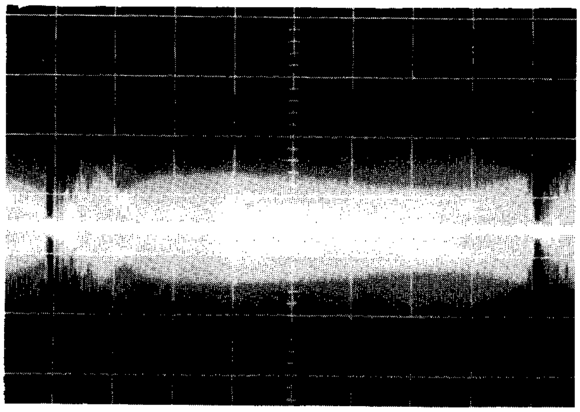
Note: Only used if no registration chart is available.

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP305 3.58 MHz Carrier	VR602 V. Size	White	Scope	TP605 Vss

1. Aim the camera at a white chart.
2. Observe the vertical interval of 3.58 MHz carrier signal at TP305, trigger from TP605.
3. Adjust V. size control VR602 for minimum beat signal, see Fig. 23. If the V. size is not adjusted properly, beats will appear.
4. The proper adjustment will show less than two peaks per envelope.
5. Aim the camera at the small object placing it in the center of the monitor screen.
6. Adjust V. center VR603 so that the small object does not shift vertically as you zoom in and out.



Before Adjustment
0.2V 2msec



After Adjustment
0.2V 2msec

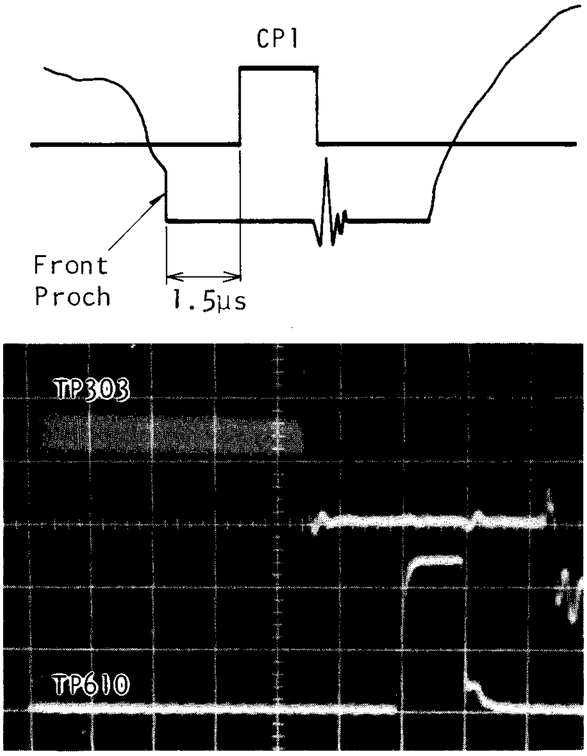
Fig.23 Waveform of V Period at TP307

(11) CONFIRM VIDICON TURNING ADJUSTMENT
If necessary, repeat step 6 than proceed to step 12.

(12) HORIZONTAL CENTERING ADJUSTMENT (Clamp Pulse Timing)

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP303 Preamp. out TP610 CP1	VR617 H. Cent.	White	Scope	TP608 Hss

1. Aim the camera at white chart.
2. Connect one scope probe to TP303 and observe the horizontal blanking interval of signal.
3. Connect the other scope probe to TP610 (CP1).
4. Adjust horizontal centering control VR617 so that the trailing edge of video (front porch of optical black) and the leading edge of CP1 (Clamp Pulse-1) will be 1.5 µsec. as shown in Fig. 24.



1µsec.

Fig.24 Waveform for H.Cent. (H.Blanking Signal at TP303 and CP1).

Note:
With some vidicons the scope display will show a double trace at the end of a horizontal line.
if this occurs, proceed as follows:

1. Confirm the vidicon turning adjust.
2. If the vidicon turning adjustment is OK, adjust VR617 so that the time between the trailing edge (a) of the video signal and the leading edge of CP1 will be 1.5µsec (Fig. 25).

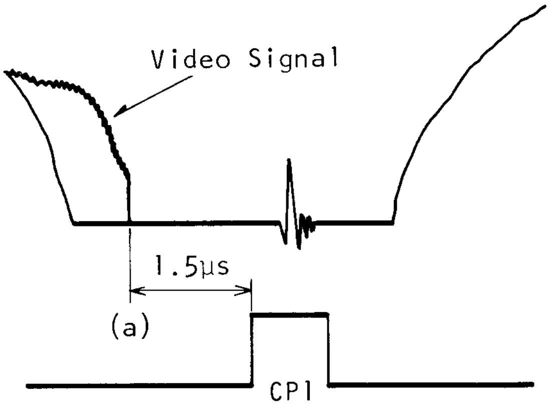


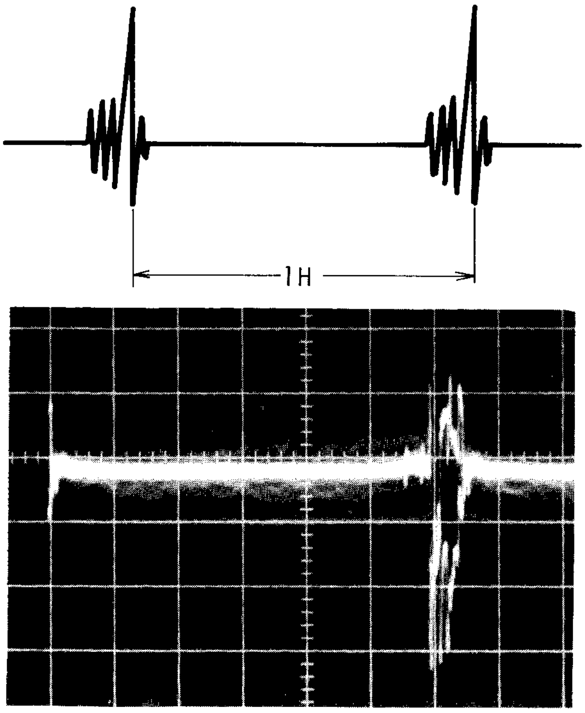
Fig.25

(13) DARK SHADING ADJUSTMENT

Note:
Set iris control to close and wait 5 minutes before making adjustment.

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP304	VR606 H. Saw. VR607 H. Par.	/	Scope	TP608 Hss

1. Observe the signal at H. rate at TP304 and adjust VR606 (H. Sawtooth) and VR607 (H. Parabola) for the flatest waveform during the horizontal period as shown in Fig. 26.
2. Recheck target adjustment (Step 1) and adjust if necessary.



0.5V 10µsec

Fig.26 Waveform Dark Shading

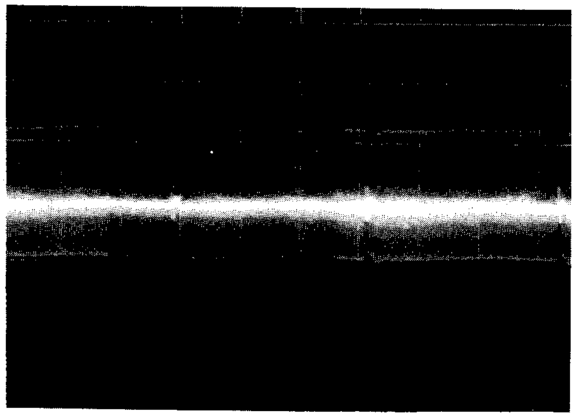
(14) CONFIRM BEAM CURRENT ADJUSTMENT

If dark shading and target adjustments are made, check and readjust the beam current (step 2) if necessary.

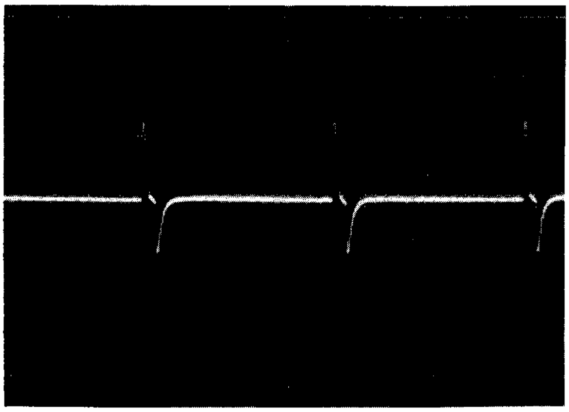
(15) DYNAMIC FOCUS ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP312 R-Y Signal	VR608 H. Saw. VR609 H. Par. VR610 V. Par. VR611 V. Saw.	White	Scope and Color Monitor	TP605 Vss TP608 Hss

1. Observe the waveform at TP604, it should be flat at H. and V. rate. If it is not flat, perform the following adjustments before the adjustment of dynamic focus.
2. For horizontal rate (Hss trigger), adjust VR609 (H. Parabola) and VR608 (H. Sawtooth) for a flat waveform, as shown in Fig. 27.



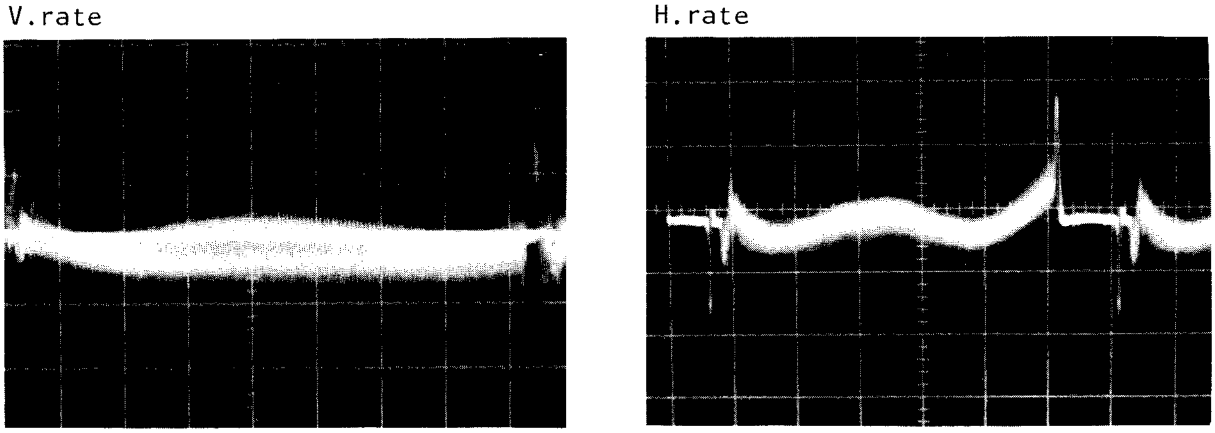
V.rate



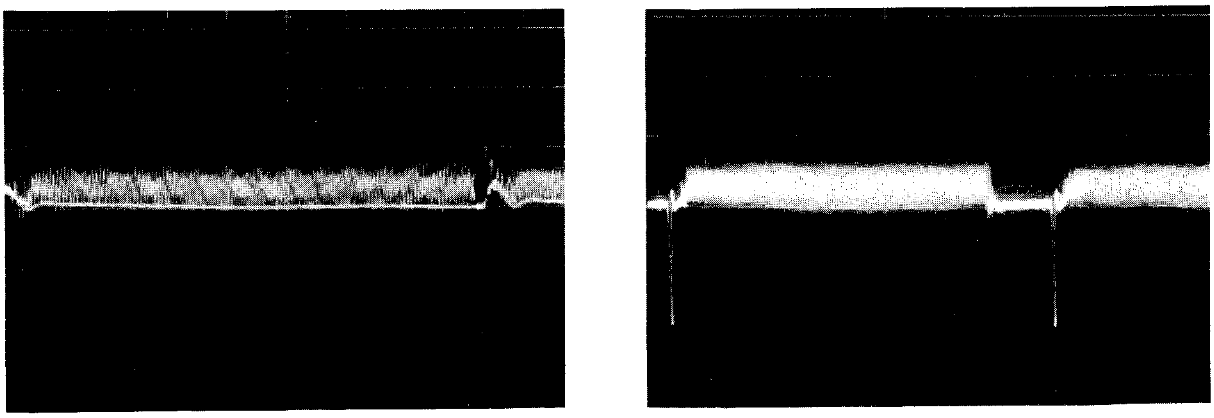
H.rate

Fig.27 Waveform of TP604

3. For vertical rate (Vss trigger), adjust VR611 (V. Parabola) and VR610 (V. Sawtooth) for a flat waveform in the same manner.
4. Observe the color monitor and adjust VR604 (Focus) so that center area shows red (Magenta) color (Minimize green).
5. Observe the waveform at TP312.
6. For H. rate (Hss trigger), adjust VR608 (H. Sawtooth) and VR609 (H. Parabola) for a flat waveform.
7. Similarly, for V. rate (Vss trigger), adjust VR610 and VR611 for a flat waveform.
8. Readjust VR608 & VR609 and VR610 and VR611 as described items 6 and 7.
9. Check the color monitor for green tinting at the corners or sides. The green color should be eliminated after the above adjustments in most cases.
10. If the green color has not been eliminated, fine adjust the alignment rings of the vidicon to eliminate the green color.
11. If the fine adjustment of alignment ring is performed, it is necessary to readjust the horizontal centering as described in step 12.



Before Adj. Before Adj.



After Adj. After Adj.

Fig28 Dynamic Focus Waveform

12. Confirm that the adjustments for horizontal linearity and size as described in step (9) has not shifted.
13. Confirm that the adjustments for vertical size as described in step (10) has not shifted.

(16) COLOR SHADING ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP311 B-Y TP312 R-Y Signal	VR612,VR613 VR624,VR627 VR614,VR615 VR625,VR626	White	Scope Color Monitor	TP608 Hss TP605 Vss

1. Shot a white field with a light intensity of about 4000 lux and connect probe at TP312.
2. Observe the R-Y signal at H rate at TP312.
3. Adjust VR322 (R gain) so that the R-Y signal touches the blanking line.
4. For horizontal rate (Hss trigger), adjust VR614 and VR615 for the R-Y signal waveform to be flatest during horizontal period as shown in Fig. 29.

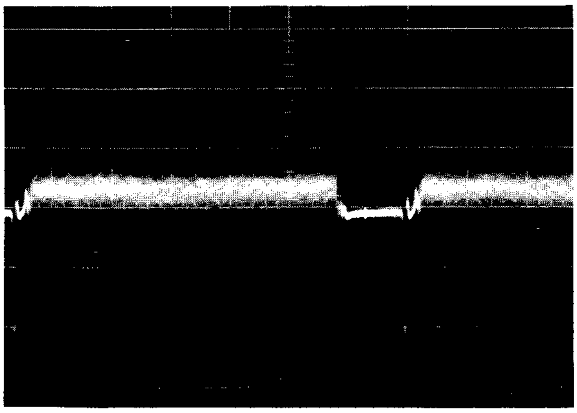


Fig.29 R-Y Signal (H.rate)

5. For vertical rate (Vss trigger), adjust VR625 and VR626 for the R-Y signal waveform to be flatest during vertical period as shown in Fig. 30.

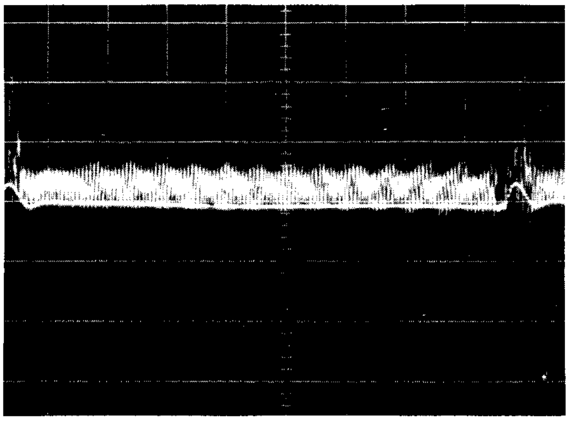


Fig.30 R-Y Signal (V.rate)

6. Observe the B-Y signal at H. and V. rate at TP311.
7. Adjust VR319 (B gain) so that the B-Y signal touches the blanking line.
8. For horizontal rate (Hss trigger), adjust VR612 and VR613 for the B-Y signal waveform to be flatest during horizontal, period as shown in Fig. 31.

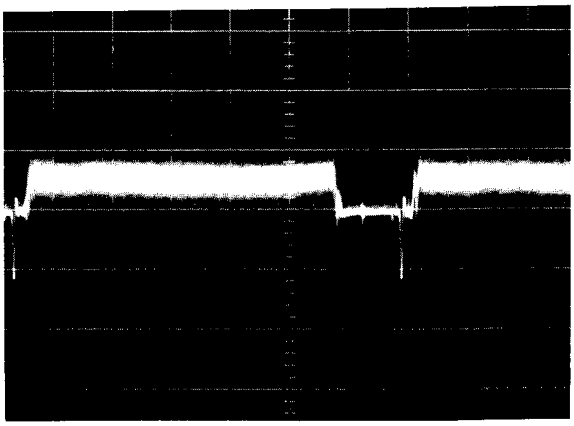


Fig.31 B-Y Signal (H.rate)

9. For vertical rate (Vss trigger), adjust VR624 and VR627 for the B-Y signal waveform to be flatest during vertical period in the same manner.

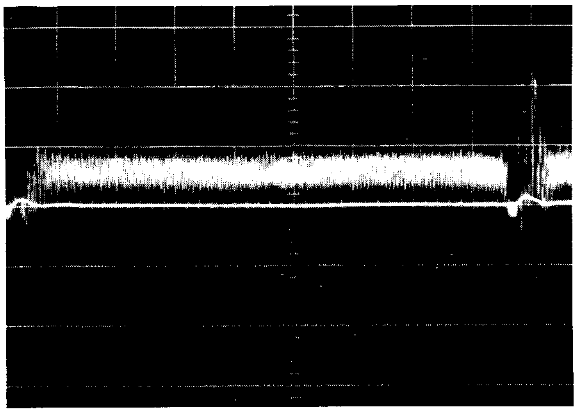


Fig.32 B-Y Signal (V.rate)

[3] PROCESS CIRCUIT ADJUSTMENT

ADJUSTMENT FLOW CHART FOR PROCESS CIRCUIT

(1) Color Gamma Circuit Release
(2) Vertical Edge Balance Adjustment
(3) Carrier Balance Adjustment
(4) Red/Blue Signal Separation Adjustment
(5) R Pedestal Adjustment
(6) R and B Gain YL Ped. Adjustment
(7) R and B Gamma Adjustment
(8) White Balance Fine Adjustment
(9) AWC (Automatic White Balance Control) Adjustment
(10) High Luminance Chroma Clip Adjustment
(11) NTSC Pedestal Adjustment
(12) NTSC AGC Adjustment
(13) Vertical Edge Gain Adjustment
(14) Color Signal Adjustment

Preparation:
Confirm the following items before proceeding with process circuit adjustment.

1. Position of User Adjustments
   Color Control Knob............... Center position
   Auto/Manual Iris Control SW...... Auto position
   Color Temperature Correction SW.. Off position (Indoor)
   AGC SW..........." ON " position
2. Test Pattern Light Box
   a test pattern light box is used for many adjustments. Make sure that the AC voltage is proper and the correct pattern is used for each step.
3. Reflection Chart
   When the reflection chart is used, the following light condition is required.
   Color Temperature: 3200 K
   Light Intensity : 1400∿2000 Lux (on the chart surface)
   Make sure that the correct pattern is used for each step.

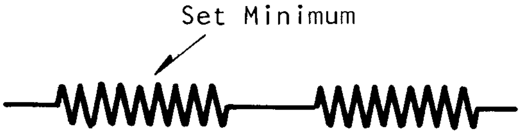
(1) COLOR GAMMA CIRCUIT RELEASE

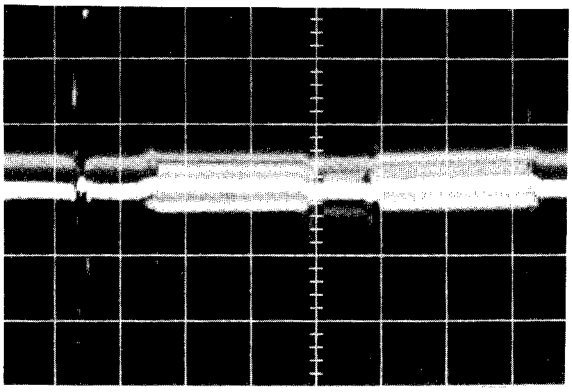
Turn VR308, 309, 310 and 311 clockwise, and turn VR312 counterclockwise.
(Note: adjust each potentiometer from the component side of circuit board).

(2) VERTICAL EDGE BALANCE ADJUSTMENT

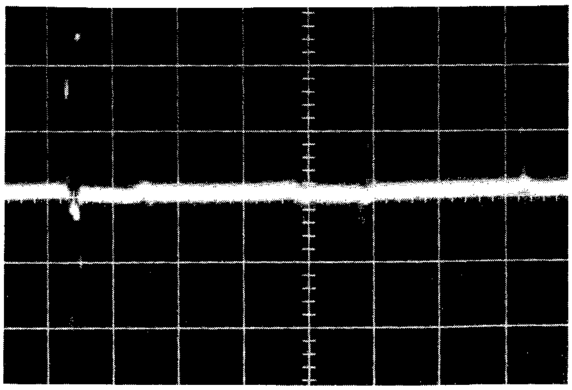
TP	Adj.	Chart	Test Instrument	Scope Trigger
TP301 V-Edge Correction Signal	VR301 V-Edge Bal. TP302 V-Edge Gain	Gray-Scale	Scope	TP605 Vss

1. Aim the camera at the gray-scale chart.
2. Observe the waveform at TP301 and adjust VR302 so that the vertical correction signal at TP301 is maximized.
3. Adjust VR301 so that the video level is minimized as shown in Fig. 33.





No Good 20mV/2msec.div.



Good 20mV/2msec.div.

Fig.33 V.Edge Correction Signal at TP301

4. Turn the VR302 fully counterclockwise position (component side).

(3) CARRIER BALANCE ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
NTSC Signal	VR320 VR323	/	Scope	TP608 Hss

1. Set iris control to close.
2. Confirm that the AWC indicator glows red. If not, turn the power off and wait 5 minutes, to release the AWC circuit. Then, turn the power on.
3. Connect probe at the video output connector on the power supply unit and observe the NTSC signal.
4. Alternately adjust VR320 and VR323 to minimize carrier leakage. (See Fig. 34).

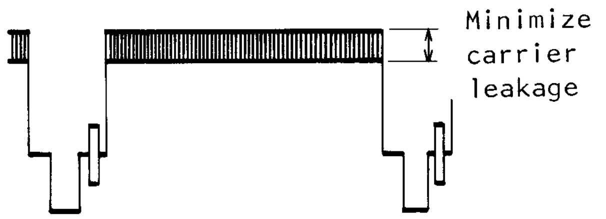


Fig.34

(4) RED/BLUE SIGNAL SEPARATION ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP308 B Signal TP310 R Signal	VR317 Separation Phase VR318 Separation Gain	Gray-Scale	Scope	TP608 Hss

1. Aim the camera at the gray-scale chart.
2. Observe the signal at TP308 and TP310 at the same time. If the B signal (TP308) has R contamination, the waveform will be unstable and has changing amplitude.
3. Adjust VR318 to minimize instability and waveform flicker.
4. Adjust VR317 for same effect.
5. Alternately adjust VR317 and VR318 to minimize the waveform flicker.

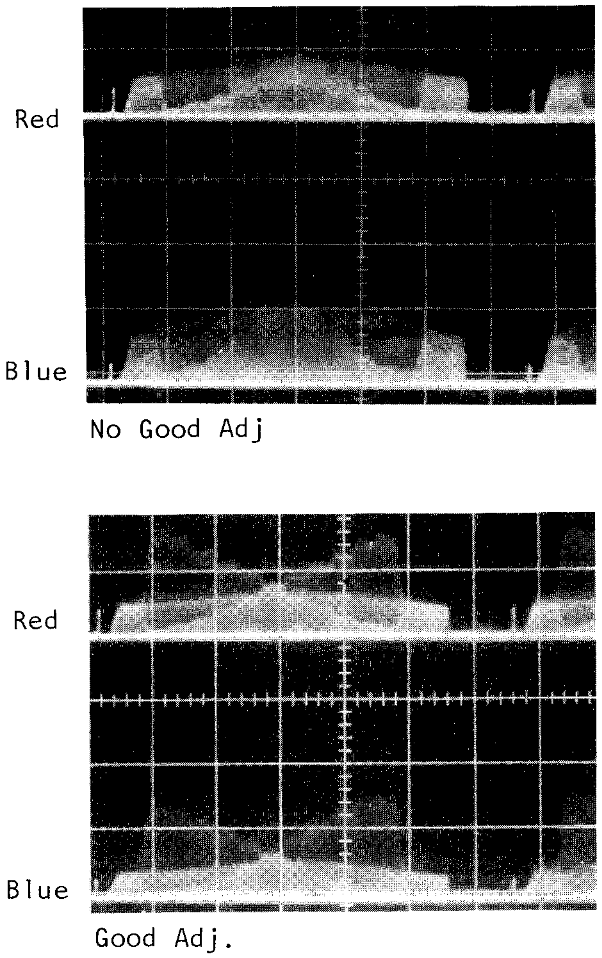


Fig.35

(5) R PEDESTAL ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
/	VR321 R. Ped.	Gray-Scale	Color Monitor	/

1. Aim the camera at the gray-scale chart.
2. Observe the color monitor and adjust VR321 so that the monitor shows red color (maximize red).

(6) R ANB B GAIN YL PEDESTAL ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
NTSC Signal (Output Signal)	VR319 VR322 VR307 VR320 VR323	Gray-Scale	Scope	TP608 Hss

Note:
Confirm the each VR knob and SW positions before proceeding this adjustment.

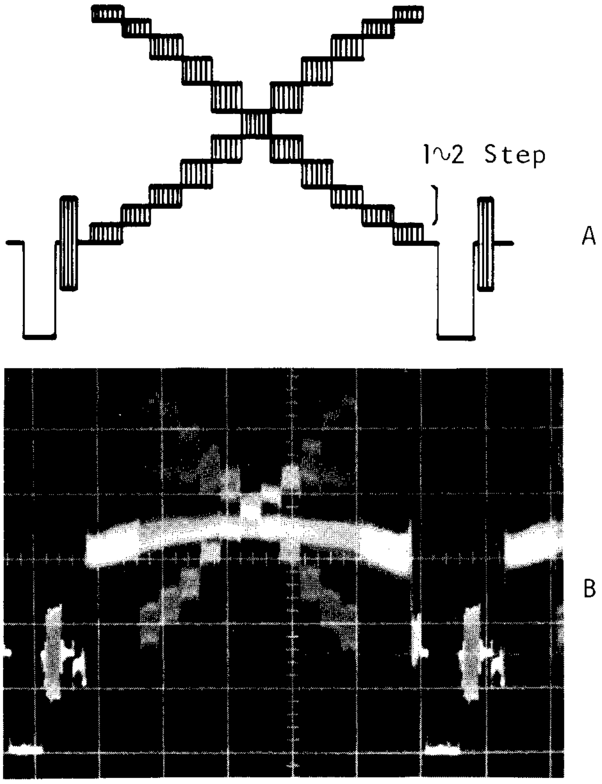
Color Control Knob ....
Center position (detent position)

Auto/Manual Iris Control SW ....
Auto position

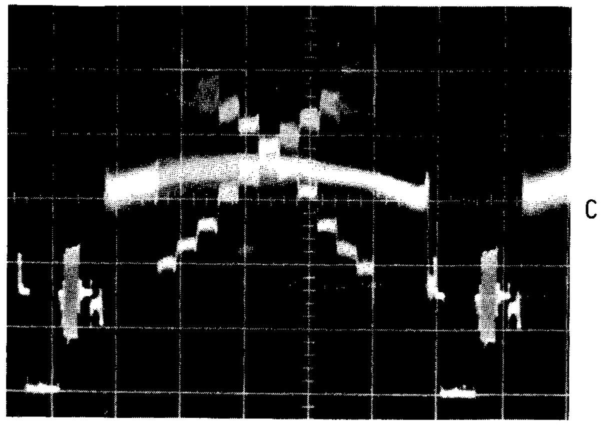
Color Temeprature Correction SW ....
"Indoor" position

AGC SW or LT. SENS SW ....
"ON" position or "+6dB" position

1. Aim the camera at the gray-scale and observe the NTSC signal.
2. Adjust VR307 (YL Ped.) to minimize carrier leakage on the first or second steps from the bottom (See Fig. 36-a).
3. Alternately adjust VR319 (B gain) and VR322 (R gain) to minimize the carrier leakage on the bottom half or gray-scale waveform (steps 1 through 6).
4. Alternately repeat steps 2 and 3 to minimize carrier leakage on the bottom half of gray-scale (steps 1 through 6, including gray background), see Fig. 36.



Before Adj.



After Adj.

Fig.36 NTSC Waveform

5. If there is excessive carrier leakage at the one or two steps from the bottom, adjust VR320, VR323 and VR321 to minimize it.

(7) R AND B GAMMA ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
NTSC Signal	VR312 Gamma Reference Voltage VR310 R gamma VR311 R degamma VR308 B gamma VR309 B degamma	Gray-Scale	Scope	TP608 Hss

1. Aim the camera at the gray-scale.
2. Connect scope probe to the video output connector on the power supply unit and observe the NTS signal.
3. Turn VR310 (R gamma) fully counter-clockwise.
4. Adjust VR312 (gamma reference voltage) so that the chroma knee point is located 5 steps from the top, then turn VR310 to fully clockwise, to release R gamma.
5. Adjust VR310 (R gamma) and VR308 (B gamma) to minimize the carrier leakage at third through fifth steps from the top.
6. Adjust VR311 (R degamma) and VR309 (B degamma) to minimize carrier leakage at first through third steps from the top.

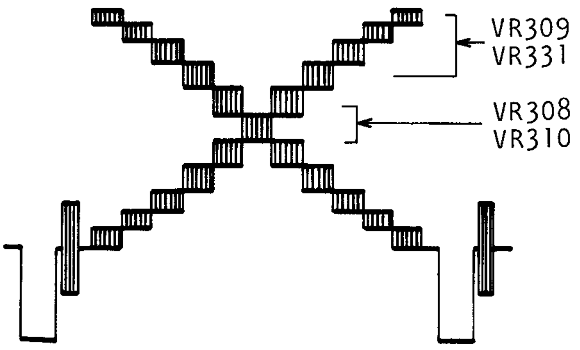


Fig.37 NTSC Waveform

Note:
It is normal to have some residual carrier leakage ... particularly at the top steps of the waveform, depending on tube quality.

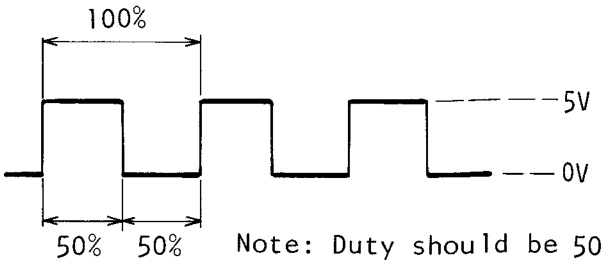
(8) WHITE BALANCE FINE ADJUSTMENT

Repeat (6) R and B gain adjustment and (7) R and B gamma adjustment.

(9) AWC (AUTOMATIC WHITE BALANCE CONTROL) ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP615 R-Y Comparator signal	VR701	Gray-Scale	Scope	TP605 Vss
TP616 B-Y Comparator signal	VR702			

1. Turn the power off and wait 5 minutes, to release the automatic white balance control (AWC).
2. Then, turn the power on and confirm that the AWC indicator glows red.
3. Aim the camera at the gray-scale chart and check for no color in picture.(correct white balance)
4. Connect scope probe to TP615 and observe the waveform at V. rate.
5. Place the scope in DC mode.
6. Adjust VR701 so that the signal appears as shown below.



Note: Duty should be 50%

Fig.38

7. Connect probe to TP616 and observe the waveform at V. rate.
8. Adjust VR702 in the same manner.
9. Aim the camera at white chart.
10. Confirm that white balance is correct when the AWC switch is turned on.

(10) HIGH LUMINANCE CHROMA CLIP ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
/	VR303 H.C. Gain	Gray Scale	Monitor	/

1. Aim the camera at the gray-scale chart and observe the picture on the monitor.
2. Zoom out to 12mm.
3. Check whether the high luminance part, from the whitest step of the gray-scale to the fourth step shows greenish or yellowish response, Adjust VR303 (H.C. GAIN) to eliminate this, as shown in Fig. 39. The picture should be white/gray during these steps.

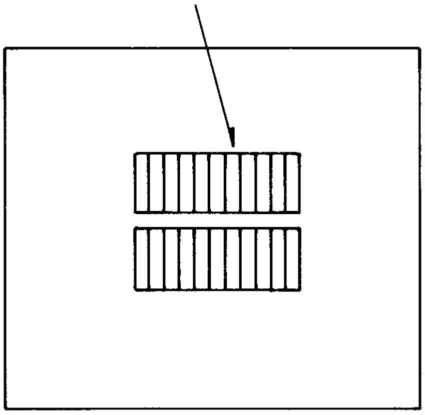

High Luminance Parts Should Show no Color When Adjusted by VR303

Fig.39

(11) NTSC PEDESTAL ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
NTSC Signal	VR313 NTSC Ped.	/	Scope Monitor	TP608 Hss

1. Connect the NTSC output terminal (Camera) to the monitor TV.
2. Set iris control to close and observe the NTSC signal (Camera output).
3. Adjust VR313 for 0.07 Vp-p as shown in Fig. 40.

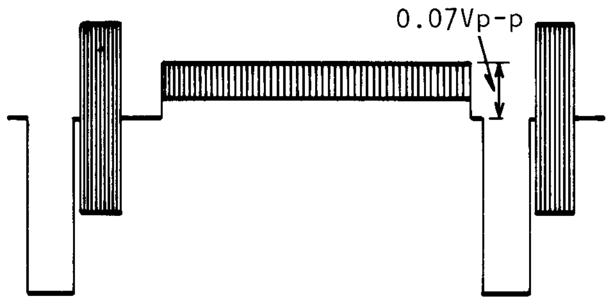


Fig.40

(12) NTSC AGC ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
NTSC Signal	VR315 AGC Level	Gray Scale	Scope	TP608 Hss

1. Aim the camera at the gray-scale chart and observe the NTSC signal (Camera output).
2. Adjust VR315 for 0.7V as shown in Fig. 41.

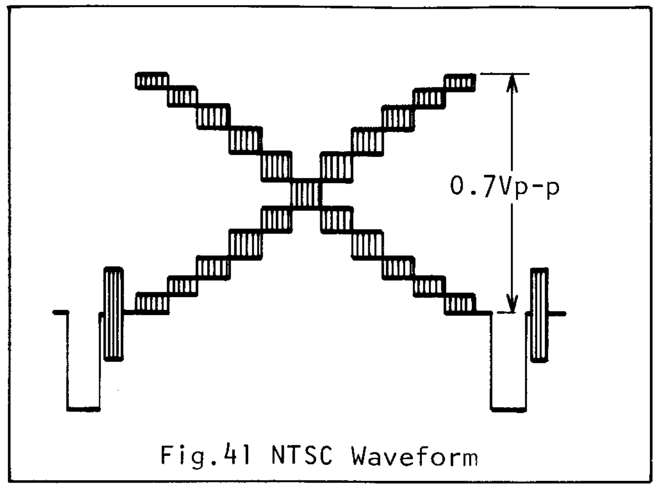


Fig.41 NTSC Waveform

(13) VERTICAL EDGE GAIN ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
/	VR302 V. Edge Gain	Gray Scale	Monitor	/

1. Aim the camera at the gray-scale chart and observe the picture on the monitor.
2. Adjust VR302 to eliminate color fringing on upper and lower edges of the gray-scale, as shown in Fig. 42.

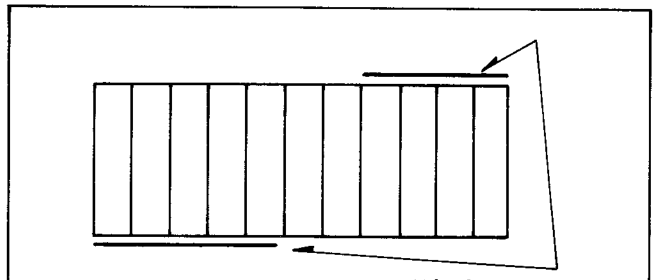


Fig.42 Picture of Gray-Scale

(14) COLOR SIGNAL ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
NTSC Signal	VR316 BF Phase VR324 B-Y gain C326 Phase VR304 Color Level VR319 B gain VR322 R Gain	Color Bar Chart Gray-scale chart	Vectorscope	

Note:
Confirm that the AWC indicator, on the EVF, glows red, before proceeding with this adjustment.
If not, turn the power off and wait 5 minutes to release the AWC circuit. Then, turn the power on.

1. Aim the camera at the color bar chart.
2. Connect the vectorscope to the video output connector on the power supply unit.
3. Observe the screen of vectorscope and adjust VR319 (B gain) and VR322 (R gain) so that the center spot (white) of vector is positioned in the center of screen as shown in Fig. 43, if necessary.

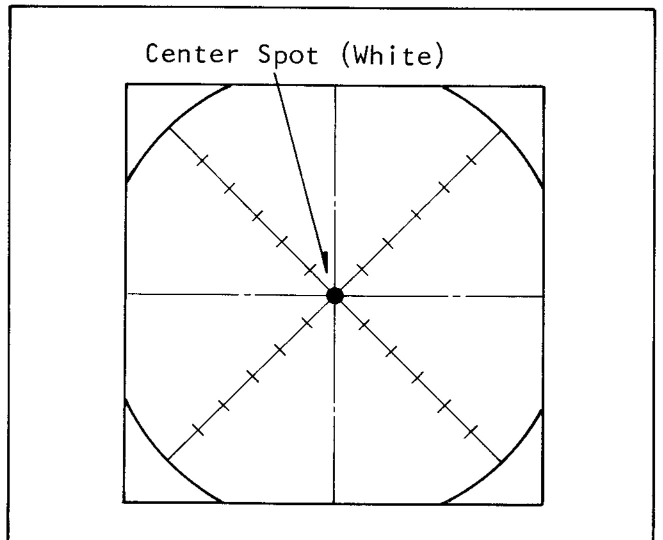


Fig.43 Screen of Vectorscope

4. Adjust the amplitude of R signal with VR304 (color level) to be within specification as shown below.
5. Adjust the total phase with VR316, VR324 and C326 to be within specification as shown below.

Specification:

1) Phase

Signal	Vector Phase
R	104° ± 15°
YL	$168^{\circ}\,^{+10^{\circ}}_{-30^{\circ}}$
CY	$284^{\circ}\,^{+20^{\circ}}_{-15^{\circ}}$

2) Amplitude

a. The amplitude of R signal is 1.5 times the burst signal.
b. The amplitude of YL signal is 1.0 ± 0.3 times the R signal.

Note:
If VR319 and VR322 are adjusted in step 3, the following adjustment is required:
1. Aim the camera at the gray-scale chart and observe the NTSC signal
2. Adjust VR319 and VR322 to minimize the carrier leakage of the NTSC signal.

[4] Electronic Viewfinder Circuit

Preparation:
1. Connect the viewfinder connector to the E.V.F. connector on the camera head.
2. Confirm that all VRs are in the center positions.
3. Set each control as follows:
   a) Contrast VR: Maximum
   b) Brightness VR: Center

(1) Horizontal Frequency
1. Set Power "ON".
2. Shoot the test pattern.
3. Short the base and emitter of Q903 using a jumper.
4. Adjust L905 for stable horizontal scanning.
5. If the horizontal picture center is improperly positioned, adjust the center ring on the deflection coil assembly.
6. If the brightness is incorrect, adjust VR904 (Brightness).
7. Remove the jumper between base and emitter of Q903.

(2) Vertical Height
1. Shoot the test pattern.
2. Adjust VR902 so that the vertical height is approx. 110% overscanned.

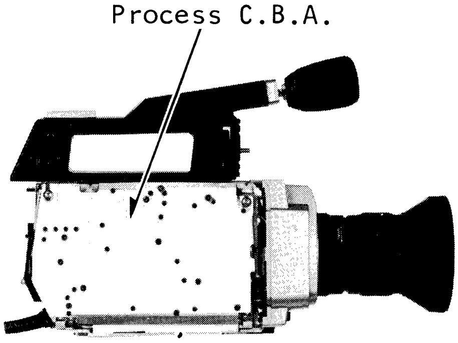
(3) Focus
1. Shoot the test pattern.
2. If the focus on viewfinder is improper but the picture on the monitor is OK, adjust VR903.

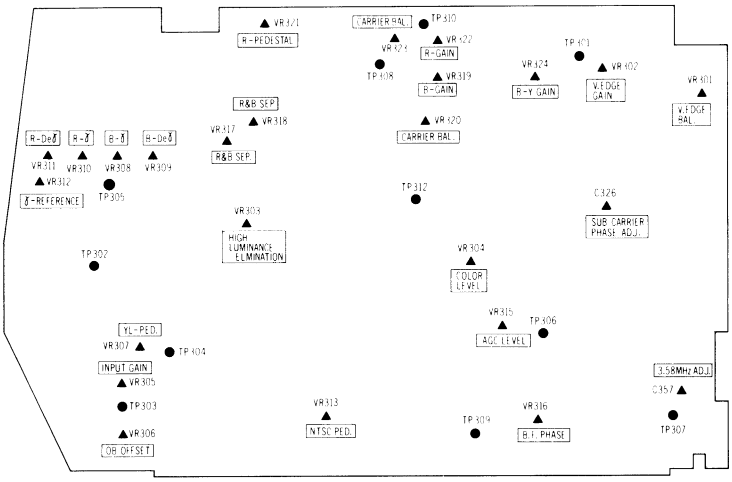
(4) High Voltage
Confirm that the CRT high voltage is 3.5 kV ± 0.3 kV using a high voltage meter.

Location of Test Points and Controls

Process C.B.A.

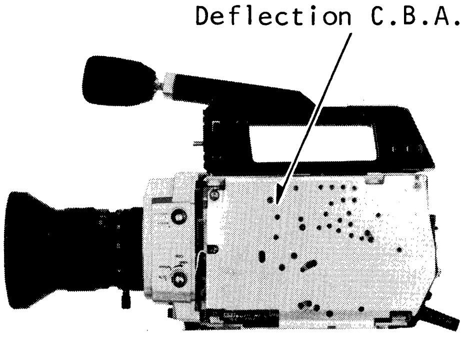
VEPW0060

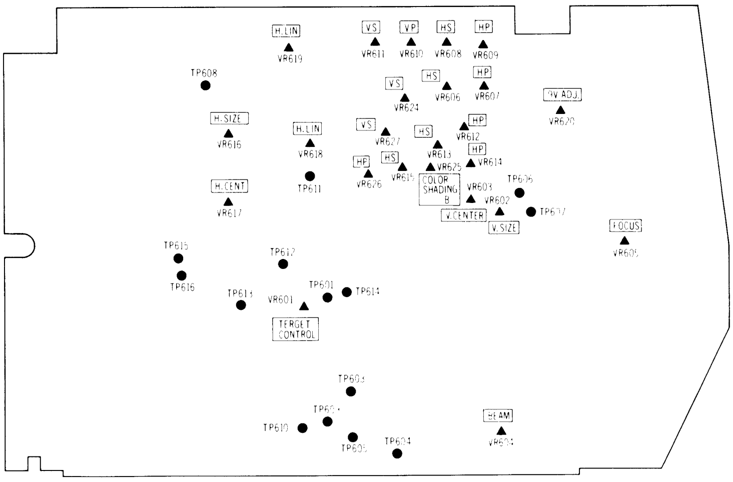

Process C.B.A.


VR321
R-PEDESTAL
CARRIER BAL.
TP310
VR323
VR322
R-GAIN
TP308
VR319
B-GAIN
VR324
B-Y GAIN
TP301
VR302
V.EDGE GAIN
VR301
V.EDGE BAL.
R&B SEP
VR318
VR317
R&B SEP.
VR320
CARRIER BAL.
R-Deγ
R-γ
B-γ
B-Deγ
VR311
VR310
VR308
VR309
VR312
γ-REFERENCE
TP305
TP312
C326
SUB CARRIER PHASE ADJ.
VR303
HIGH LUMINANCE ELMINATION
TP302
VR304
COLOR LEVEL
YL-PED.
VR307
TP304
VR315
TP306
AGC LEVEL
INPUT GAIN
VR305
3.58MHz ADJ.
C357
TP303
VR313
NTSC PED.
TP309
VR316
B.F. PHASE
TP307
VR306
OB OFFSET

Deflection C.B.A.

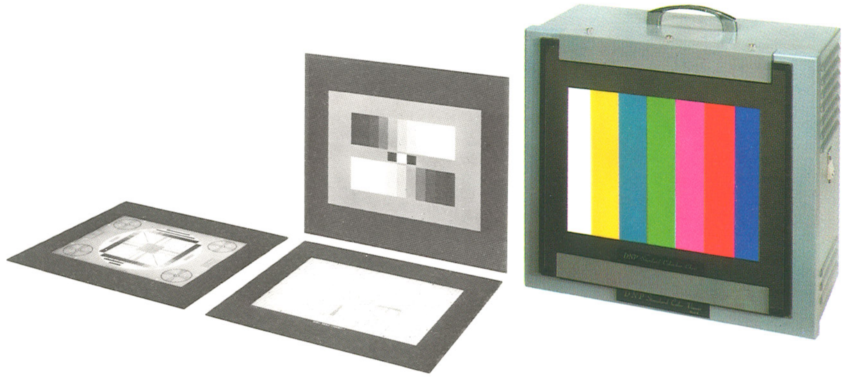
VEPW0061


Deflection C.B.A.

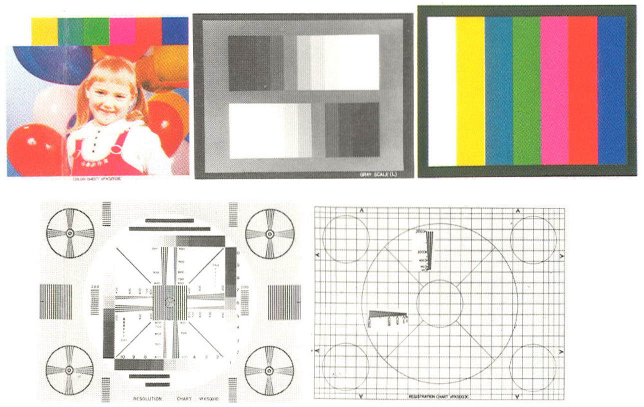

H.LIN
VR619
VS
VR611
VP
VR610
HS
VR608
HP
VR609
TP608
VS
VR624
HS
VR606
HP
VR607
9V ADJ.
VR620
H.SIZE
VR616
H.LIN
VR618
VS
VR627
HS
VR613
HP
VR612
HP
VR614
HP
VR626
HS
VR615
VR625
COLOR SHADING B
VR603
VR602
TP606
TP607
V.CENTER
V.SIZE
TP611
H.CENT
VR617
FOCUS
VR605
TP615
TP616
TP612
TP613
VR601
TP601
TP614
TERGET CONTROL
TP603
TP602
TP610
TP605
TP604
BEAM
VR604

COLOR CAMERA SERVICING FIXTURES

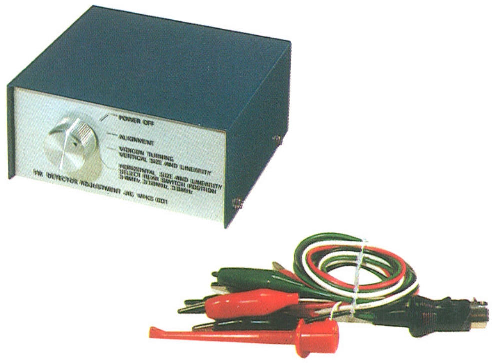
LIGHT BOX w/CHART SET VFKS002



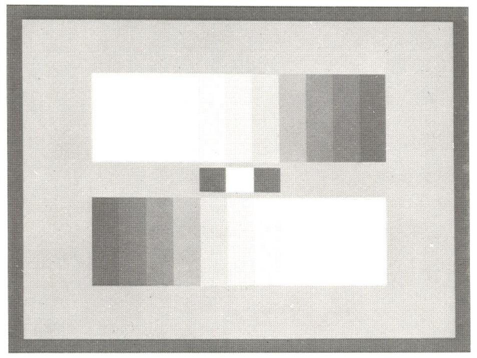
REFLECTION CHART SET VFKS003



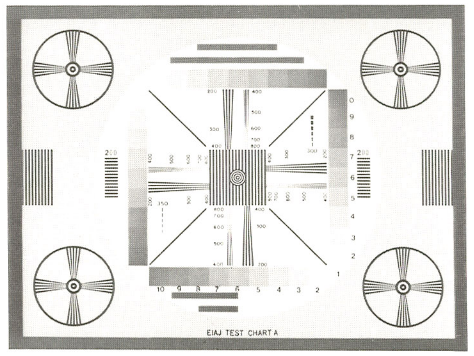
FM DETECTOR VFKS001



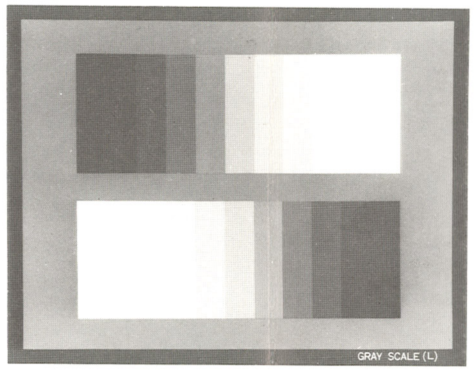
GRAY SCALE CHART VFKS002A



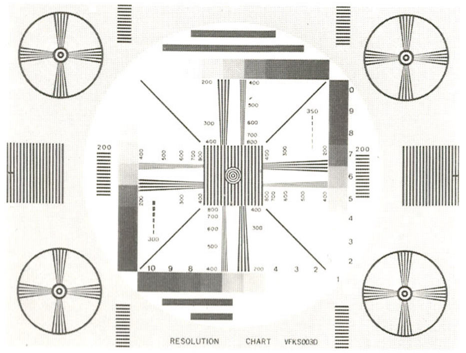
RESOLUTION CHART VFKS002D


EIAJ TEST CHART A

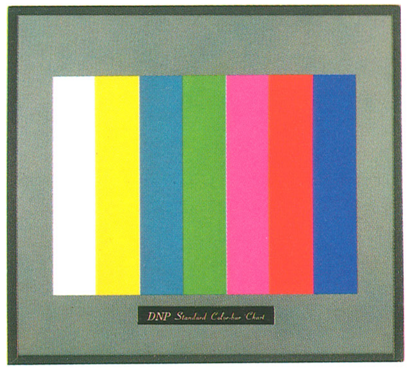
GRAY SCALE CHART VFKS003A


GRAY SCALE (L)

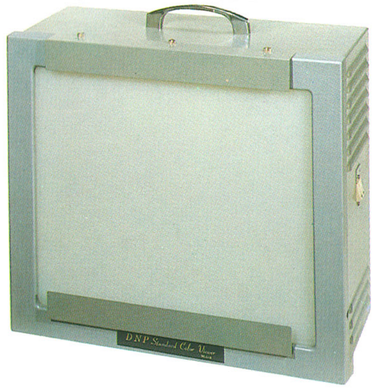
RESOLUTION CHART VFKS003D


RESOLUTION CHART VFKS003D

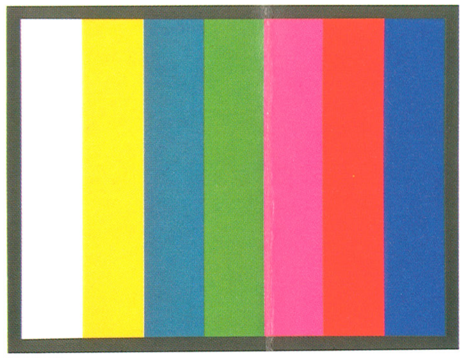
COLOR CHART VFKS002B


DNP Standard Color-bar Chart

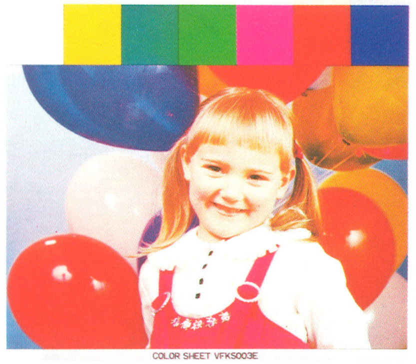
LIGHT BOX VFKS002Y



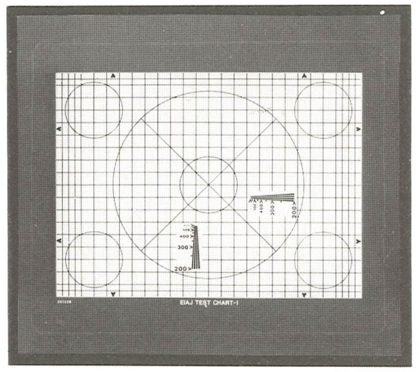
COLOR CHART VFKS003B



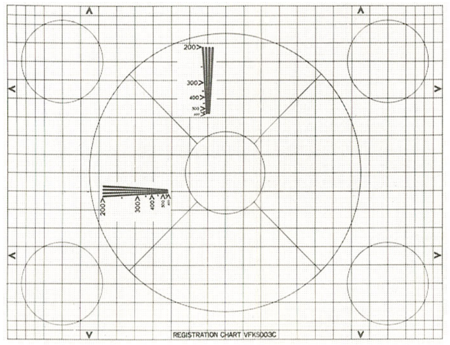
COLOR SHEET VFKS003E


COLOR SHEET VFKS003E

REGISTRATION CHART VFKS002C


EIAJ TEST CHART-I

REGISTRATION CHART VFKS003C


REGISTRATION CHART VFKS003C

ORDER NO. VRD-8105-543

Service Manual

Color Video Camera

Vol. 3

PK-751

Block Diagrams

SPECIFICATIONS:

Power Source: DC 12 V ± 10%
AC 120 V ± 10%, 60 Hz ± 0.5%
(with Power Supply Unit)
Power Consumption: DC 7.2 W at 12 V (Battery)
(with E.V.F) DC 0.7 W at Standby
Vidicon Tube System: 2/3″ frequency separation single tube system (built-in stripe filter)
Signal Carrier Frequency: 3.58 MHz
Focus System: Electro-static type
Lens Mounting: Built-in zoom lens (not "C" mount)
Lens: 6 : 1 zoom lens with auto/manual iris control.
Auto zoom lens and macro construction.
F: 1.6, f: 12 mm—72 mm
d: 1 m—infinity
Light Sensitivity: Minimum light intensity on optical image: 80 Lux (F: 1.6)
Optimum light intensity on optical image: 90 Lux
Video Output Level: 1.0 Vp-p, 75Ω (M type coaxial connector)
(Standard NTSC color signal)
Sync. System: Internal Sync: RS-170
Signal to Noise Ratio: Greater than 43 dB (luminance signal)
Horizontal Resolution: More than 240 lines
Color Temperature Control: 2 ~~step~~ switch (indoor, outdoor) & Auto adjust

Microphone: Condenser Microphone
Audio Output Level: −20 dB, Hi-impedance
Audio Output Impedance: High impedance (1 KΩ)
External Microhpone Input Impedance: 600Ω
Electronic Viewfinder: Monochrome 1.5 inch CRT
Operating Temperature: 5°C to 40°C
Operating Humidity: 10% to 75%
Operating Position: Normal position only
Weight: Camera Head with E.V.F
6.1 lbs (with Lens, 7 ft cable & shoulder pad/handle grip)
AC adaptor (option)
2.4 lbs
Demensions: Camera Head with E.V.F
7″(W) × 8″(H) × 13″(D)
177 mm(W) × 210 mm(H) × 318 mm(D)
AC adaptor (option)
3″(W) × 3″(H) × 6″(D)
80 mm(W) × 75 mm(H) × 149 mm(D)

Weight and dimensions shown are approximate.
Specifications are subject to change without notice.

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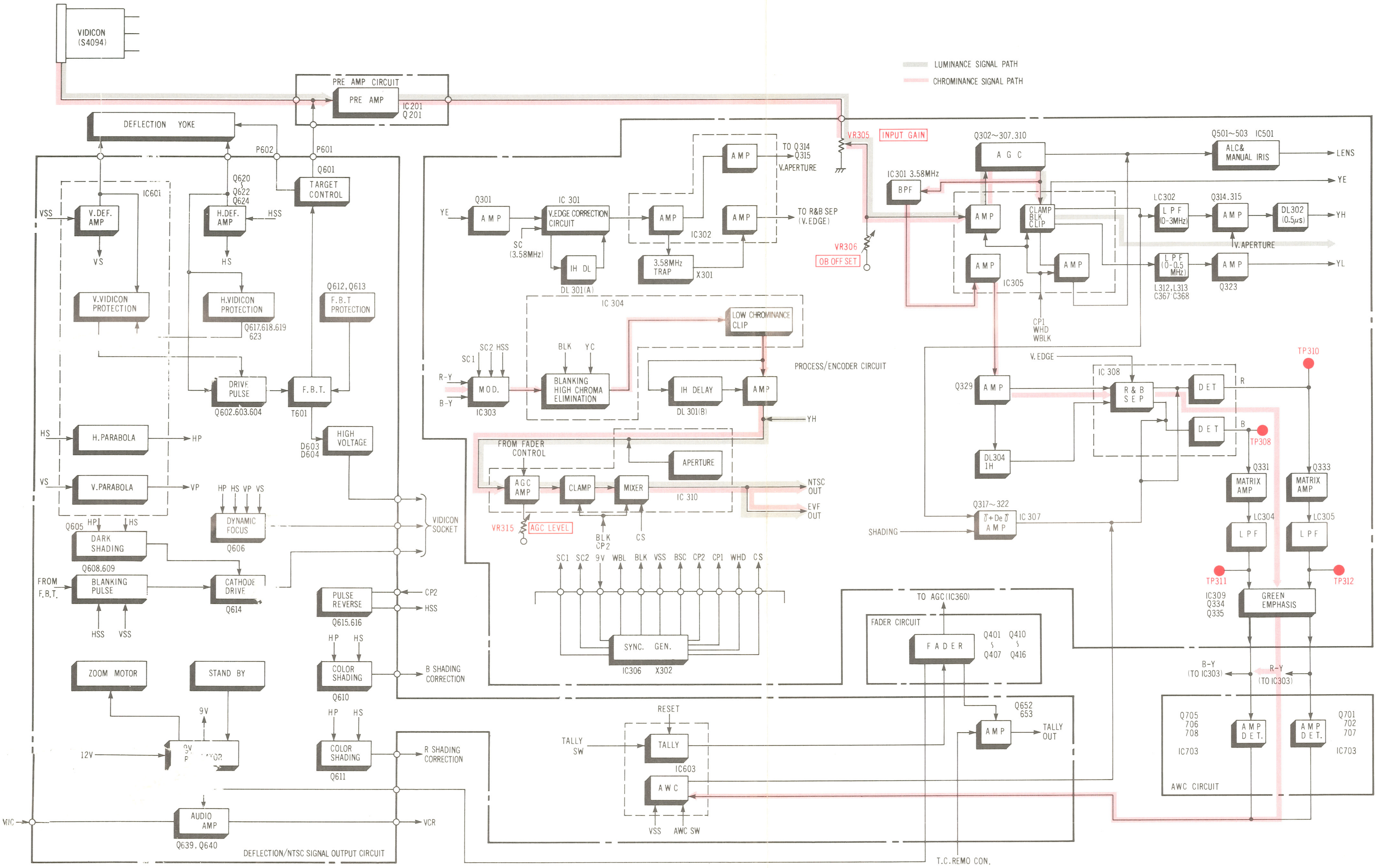
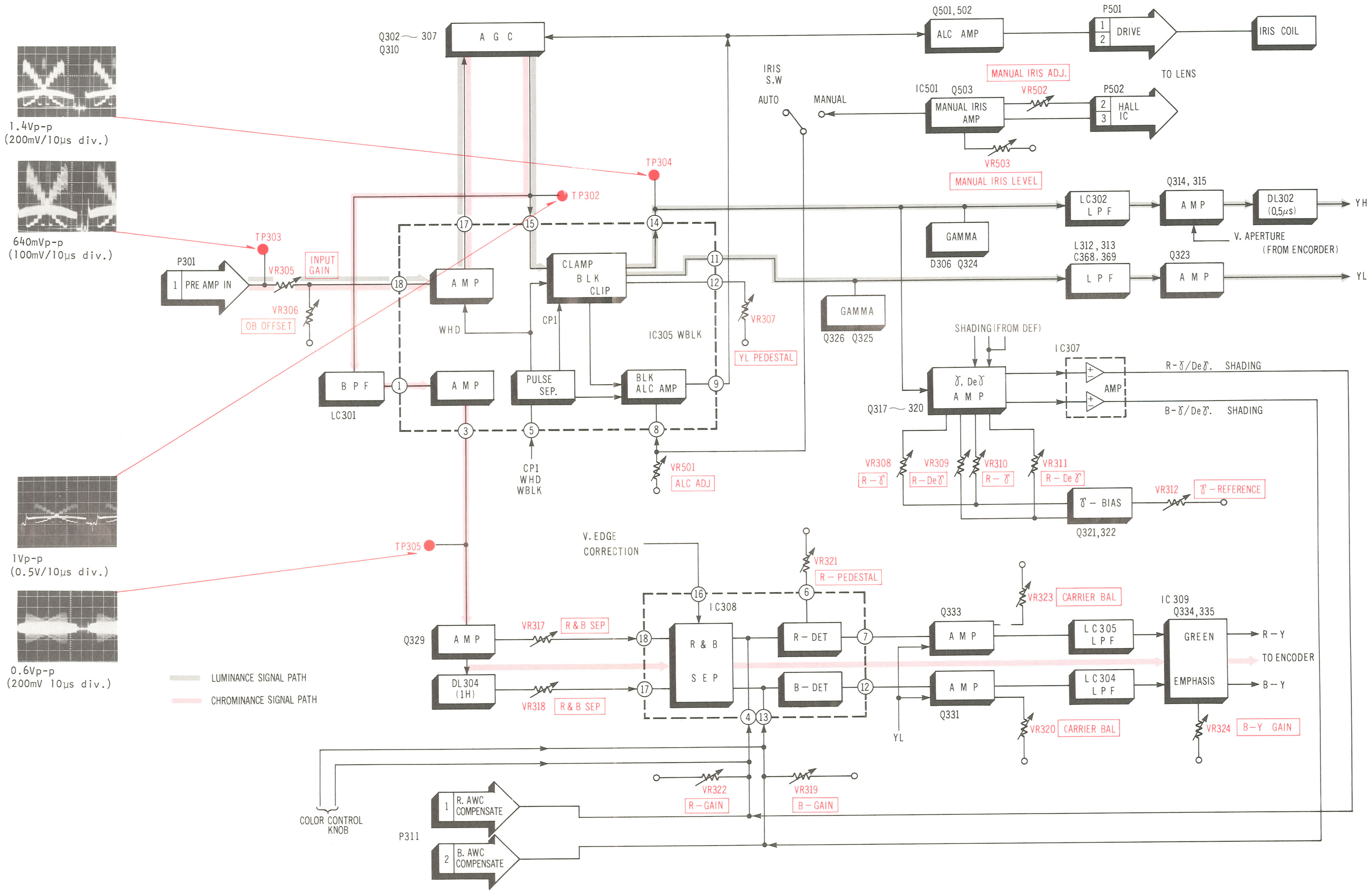
ELECTRONIC VIEWFINDER BLOCK DIAGRAM 3-6

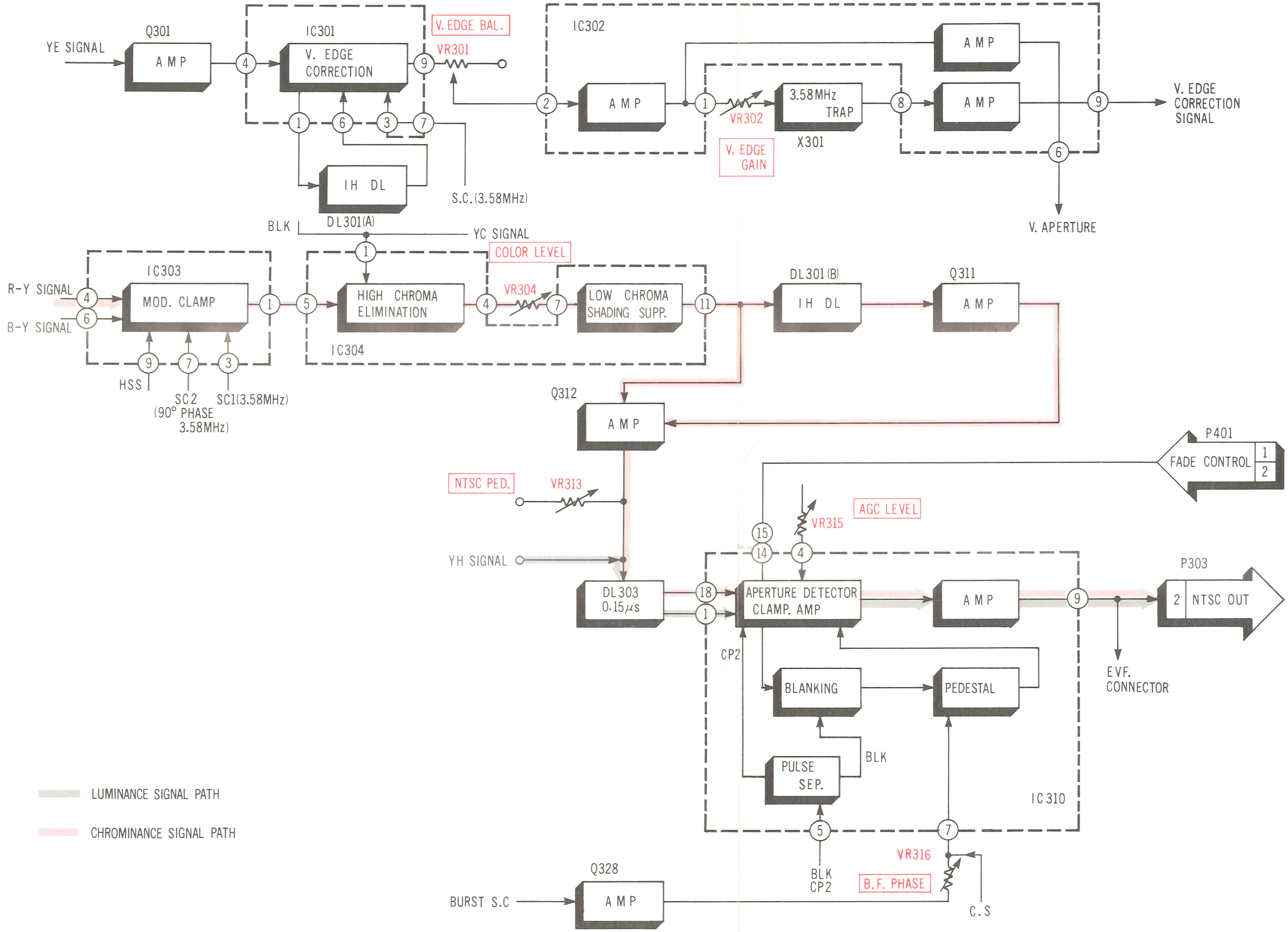
OVERALL BLOCK DIAGRAM


LUMINANCE SIGNAL PATH
CHROMINANCE SIGNAL PATH
VIDICON (S4094)
PRE AMP CIRCUIT
PRE AMP
IC201
Q201
DEFLECTION YOKE
P602
P601
Q601
TARGET CONTROL
IC601
VSS
V.DEF. AMP
VS
Q620
Q622
Q624
H.DEF. AMP
HSS
HS
V.VIDICON PROTECTION
H.VIDICON PROTECTION
Q617.618.619
623
Q612,Q613
F.B.T PROTECTION
DRIVE PULSE
Q602.603.604
F.B.T.
T601
D603
D604
HIGH VOLTAGE
H.PARABOLA
HP
V.PARABOLA
VP
HP HS VP VS
DYNAMIC FOCUS
Q606
VIDICON SOCKET
Q605
DARK SHADING
Q608.609
FROM F.B.T.
BLANKING PULSE
HSS
CATHODE DRIVE
Q614
PULSE REVERSE
Q615.616
CP2
COLOR SHADING
Q610
B SHADING CORRECTION
Q611
R SHADING CORRECTION
ZOOM MOTOR
STAND BY
9V
12V
AUDIO AMP
Q639.Q640
MIC
VCR
DEFLECTION/NTSC SIGNAL OUTPUT CIRCUIT
YE
Q301
AMP
IC301
V.EDGE CORRECTION CIRCUIT
SC (3.58MHz)
IH DL
DL301(A)
IC302
3.58MHz TRAP
X301
TO Q314 Q315 V.APERTURE
TO R&B SEP (V.EDGE)
IC304
LOW CHROMINANCE CLIP
SC1
SC2
R-Y
B-Y
MOD.
IC303
BLK
YC
BLANKING HIGH CHROMA ELIMINATION
IH DELAY
DL301(B)
PROCESS/ENCODER CIRCUIT
YH
FROM FADER CONTROL
AGC AMP
CLAMP
MIXER
APERTURE
IC310
NTSC OUT
EVF OUT
VR315
AGC LEVEL
BLK CP2
CS
SC1 SC2 9V WBL BLK VSS BSC CP2 CP1 WHD CS
SYNC. GEN.
IC306
X302
VR305
INPUT GAIN
VR306
OB OFF SET
Q302~307.310
AGC
IC301 3.58MHz
BPF
CLAMP BLK CLIP
IC305
CP1 WHD WBLK
Q501~503 IC501
ALC& MANUAL IRIS
LENS
LC302
LPF (0~3MHz)
Q314.315
DL302 (0.5μs)
YH
V.APERTURE
LPF (0~0.5MHz)
L312.L313
C367 C368
Q323
YL
V.EDGE
IC308
Q329
R&B SEP
DET
R
B
DL304 IH
TP310
TP308
Q331
Q333
MATRIX AMP
LC304
LC305
LPF
Q317~322
γ+De γ AMP
IC307
SHADING
TP311
TP312
IC309
Q334
Q335
GREEN EMPHASIS
TO AGC(IC360)
FADER CIRCUIT
FADER
Q401 Q410
Q407 Q416
B-Y (TO IC303)
R-Y (TO IC303)
Q652
653
TALLY OUT
RESET
TALLY SW
TALLY
IC603
AWC
VSS
AWC SW
Q705
706
708
IC703
AMP DET.
Q701
702
707
AWC CIRCUIT
T.C.REMO CON.

PROCESS BLOCK DIAGRAM


1.4Vp-p
(200mV/10µs div.)
640mVp-p
(100mV/10µs div.)
1Vp-p
(0.5V/10µs div.)
0.6Vp-p
(200mV 10µs div.)
LUMINANCE SIGNAL PATH
CHROMINANCE SIGNAL PATH
Q302 ~ 307
Q310
A G C
Q501, 502
ALC AMP
P501
DRIVE
IRIS COIL
TO LENS
MANUAL IRIS ADJ.
IRIS S.W
AUTO
MANUAL
IC501 Q503
MANUAL IRIS AMP
VR502
P502
HALL IC
VR503
MANUAL IRIS LEVEL
TP304
TP302
TP303
P301
PRE AMP IN
VR305
INPUT GAIN
VR306
OB OFFSET
A M P
CLAMP
B L K
CLIP
WHD
CP1
IC305 WBLK
B P F
LC301
PULSE SEP.
BLK ALC AMP
CP1
WHD
WBLK
VR501
ALC ADJ
VR307
YL PEDESTAL
LC302
L P F
Q314, 315
DL302
(0.5µs)
YH
GAMMA
D306 Q324
V. APERTURE
(FROM ENCORDER)
L312, 313
C368, 369
L P F
Q323
YL
GAMMA
Q326 Q325
SHADING (FROM DEF)
IC307
γ, Deγ
A M P
Q317 ~ 320
AMP
R-γ/Deγ. SHADING
B-γ/Deγ. SHADING
VR308
R-γ
VR309
R-Deγ
VR310
R-γ
VR311
R-Deγ
γ - BIAS
Q321, 322
VR312
γ - REFERENCE
TP305
V. EDGE
CORRECTION
VR321
R - PEDESTAL
IC308
R & B
S E P
R - DET
B - DET
Q329
VR317
R & B SEP
DL304
(1H)
VR318
R & B SEP
VR323
CARRIER BAL
Q333
LC305
L P F
IC309
Q334, 335
GREEN
EMPHASIS
R - Y
TO ENCODER
B - Y
LC304
L P F
Q331
YL
VR320
CARRIER BAL
VR324
B-Y GAIN
VR322
R - GAIN
VR319
B - GAIN
COLOR CONTROL KNOB
P311
R. AWC COMPENSATE
B. AWC COMPENSATE

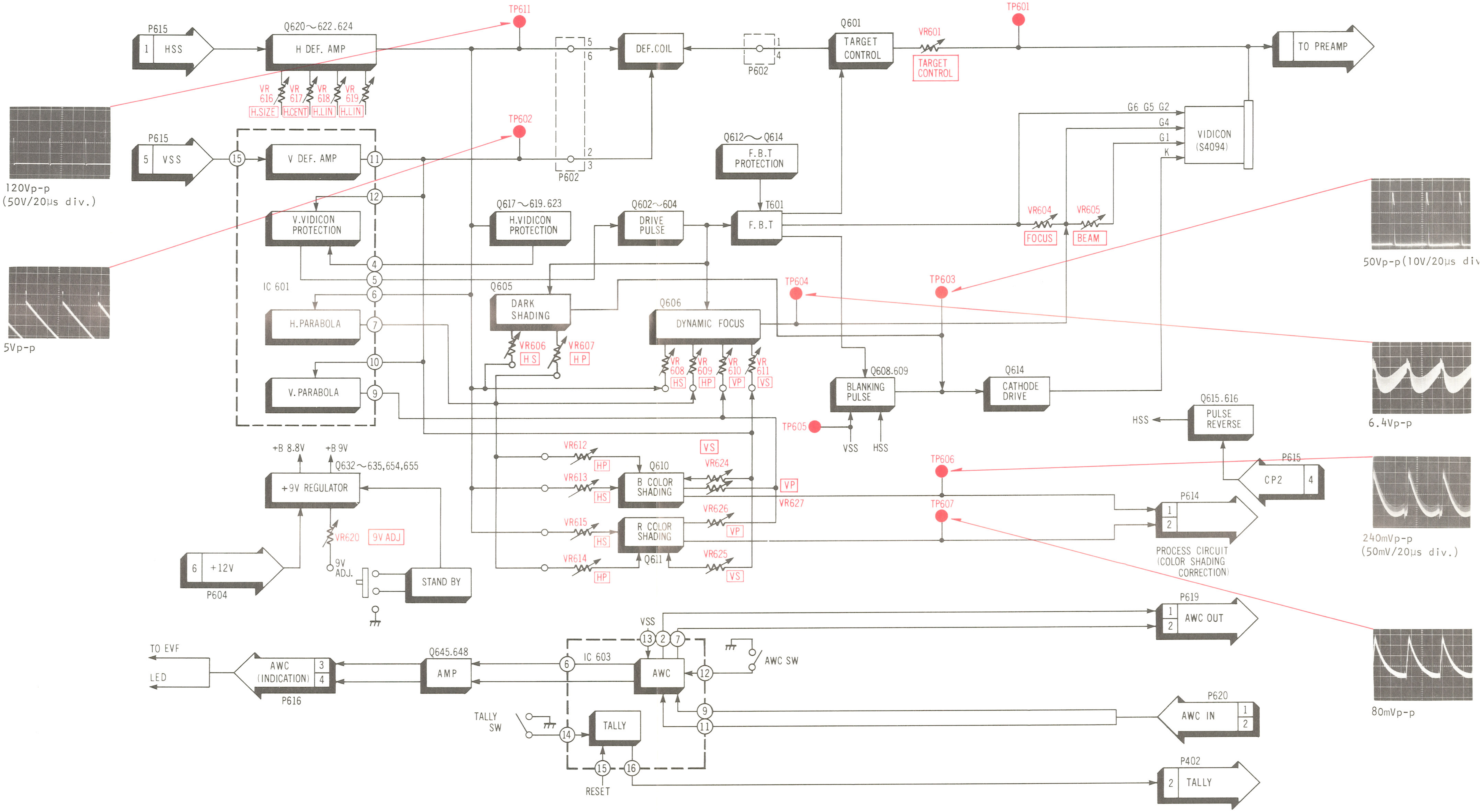
ENCODER BLOCK DIAGRAM


YE SIGNAL
Q301
AMP
IC301
V. EDGE CORRECTION
V. EDGE BAL.
VR301
IH DL
DL301(A)
S.C.(3.58MHz)
BLK
YC SIGNAL
IC302
AMP
3.58MHz TRAP
VR302
V. EDGE GAIN
X301
AMP
AMP
V. EDGE CORRECTION SIGNAL
V. APERTURE
R-Y SIGNAL
B-Y SIGNAL
IC303
MOD. CLAMP
HSS
SC2 (90° PHASE 3.58MHz)
SC1(3.58MHz)
HIGH CHROMA ELIMINATION
IC304
COLOR LEVEL
VR304
LOW CHROMA SHADING SUPP.
DL301(B)
IH DL
Q311
AMP
Q312
AMP
NTSC PED.
VR313
YH SIGNAL
DL303 0.15μs
P401
FADE CONTROL
1
2
VR315
AGC LEVEL
APERTURE DETECTOR CLAMP. AMP
AMP
P303
2 NTSC OUT
E.V.F. CONNECTOR
CP2
BLANKING
PEDESTAL
PULSE SEP.
BLK
IC310
BLK CP2
VR316
B.F. PHASE
C.S
Q328
BURST S.C
AMP

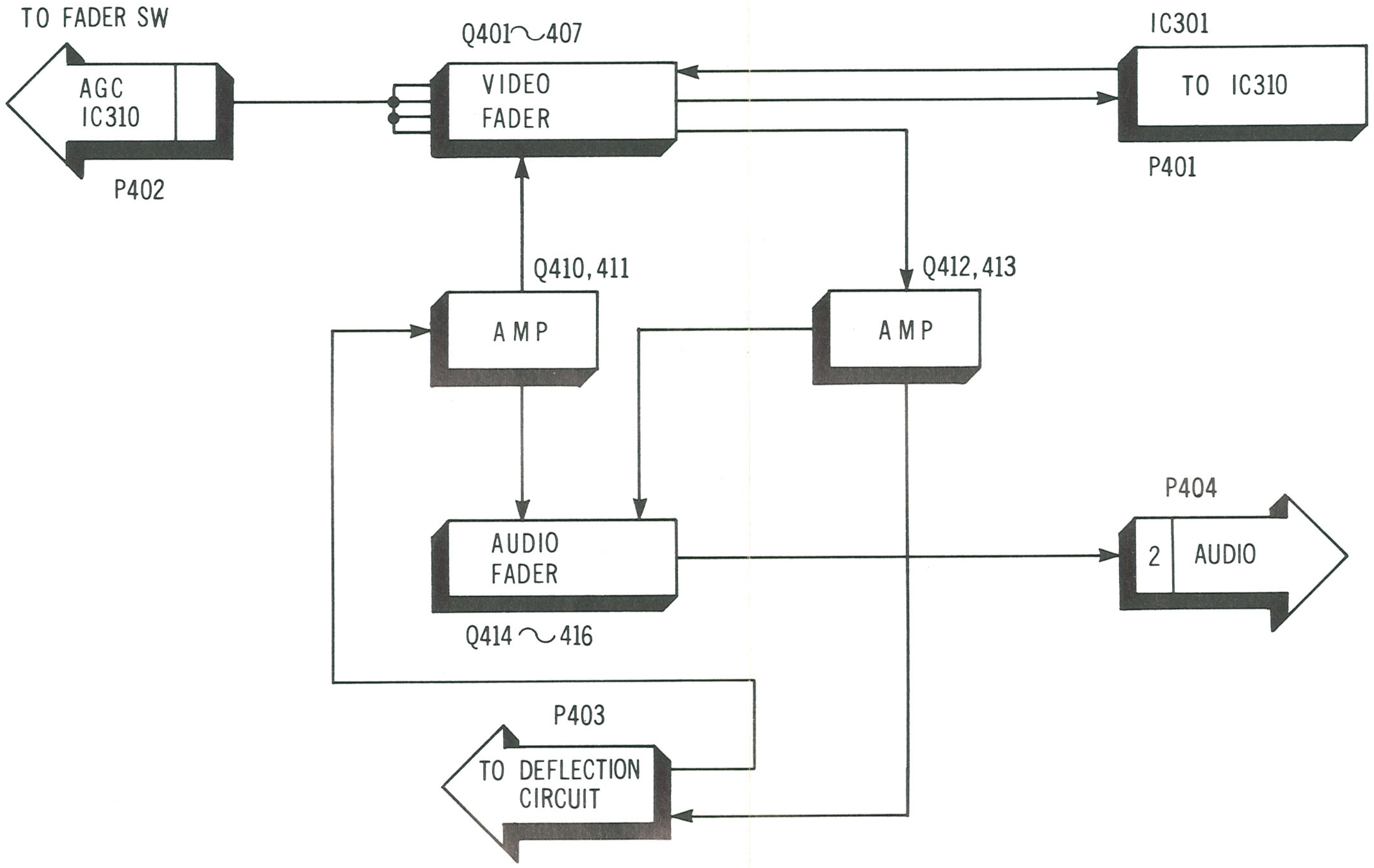
▭ LUMINANCE SIGNAL PATH

▭ CHROMINANCE SIGNAL PATH

DEFLECTION BLOCK DIAGRAM

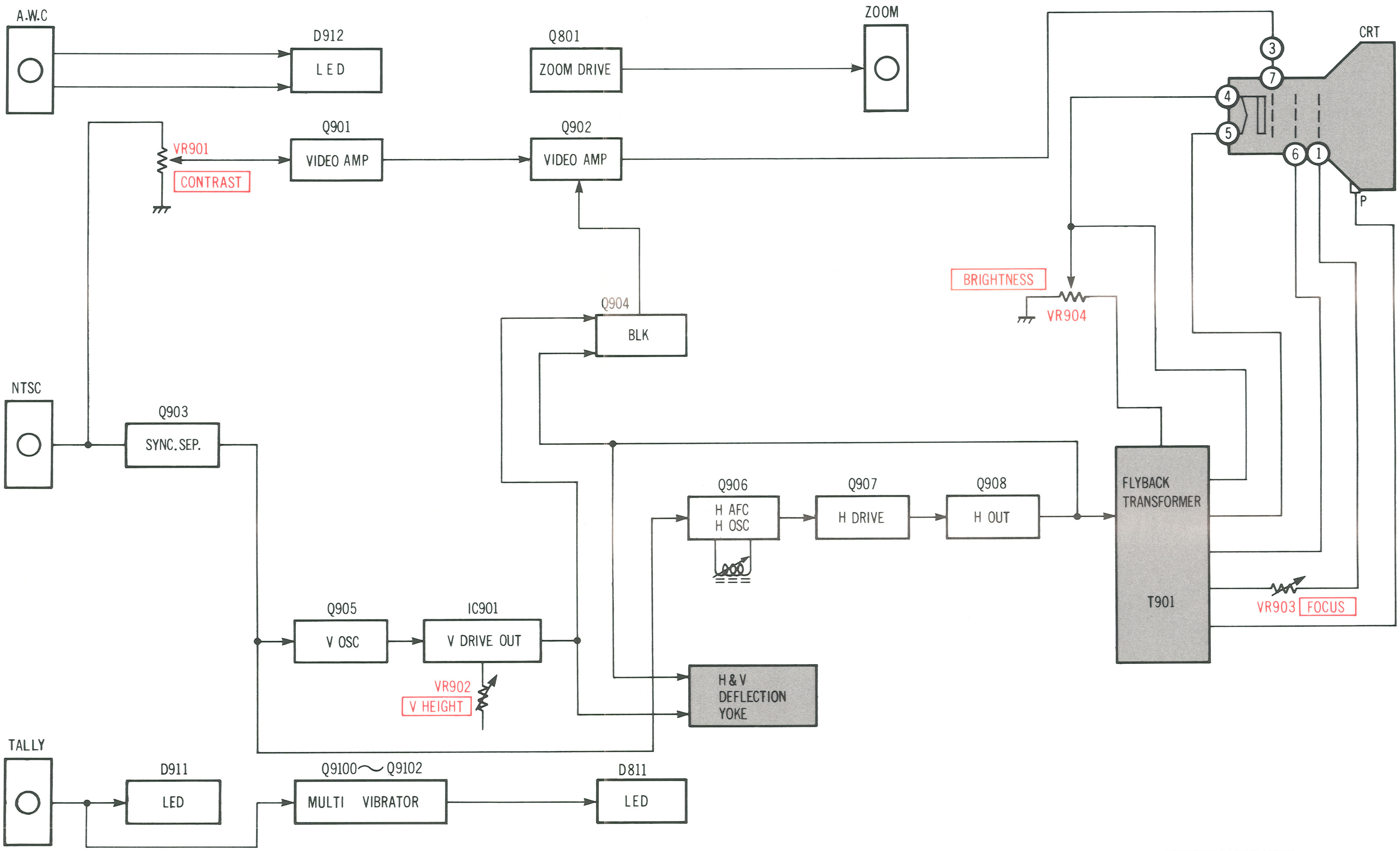

P615
1 HSS
Q620～622.624
H DEF. AMP
TP611
VR 616 H.SIZE
VR 617 H.CENT
VR 618 H.LIN
VR 619 H.LIN
120Vp-p
(50V/20μs div.)
P615
5 VSS
15
V DEF. AMP
11
12
TP602
V.VIDICON PROTECTION
4
5
6
IC 601
H.PARABOLA
7
10
V.PARABOLA
9
5Vp-p
5
6
2
3
P602
DEF.COIL
1
4
P602
Q601
TARGET CONTROL
VR601
TARGET CONTROL
TP601
TO PREAMP
G6 G5 G2
G4
G1
K
VIDICON (S4094)
Q612～Q614
F.B.T PROTECTION
T601
F.B.T
Q617～619.623
H.VIDICON PROTECTION
Q602～604
DRIVE PULSE
VR604 FOCUS
VR605 BEAM
50Vp-p(10V/20μs div
Q605
DARK SHADING
VR606 HS
VR607 HP
Q606
DYNAMIC FOCUS
VR 608 HS
VR 609 HP
VR 610 VP
VR 611 VS
TP604
TP603
6.4Vp-p
Q608.609
BLANKING PULSE
Q614
CATHODE DRIVE
TP605
VSS
HSS
Q615.616
PULSE REVERSE
HSS
+B 8.8V
+B 9V
Q632～635,654,655
+9V REGULATOR
VR620 9V ADJ
9V ADJ.
6 +12V
P604
STAND BY
VR612 HP
VR613 HS
VR615 HS
VR614 HP
Q610
B COLOR SHADING
R COLOR SHADING
Q611
VS
VR624
VP
VR627
VR626 VP
VR625 VS
TP606
TP607
P615
CP2 4
P614
1
2
PROCESS CIRCUIT (COLOR SHADING CORRECTION)
240mVp-p
(50mV/20μs div.)
TO EVF
LED
AWC (INDICATION) 3 4
P616
Q645.648
AMP
IC 603
6
AWC
VSS
13 2 7
12
AWC SW
9
11
TALLY SW
14
TALLY
15
16
RESET
P619
1 AWC OUT 2
P620
AWC IN 1 2
P402
2 TALLY
80mVp-p

FADER BLOCK DIAGRAM



TO FADER SW
AGC
IC310
P402
Q401～407
VIDEO
FADER
IC301
TO IC310
P401
Q410, 411
AMP
Q412, 413
AMP
P404
2
AUDIO
AUDIO
FADER
Q414～416
P403
TO DEFLECTION
CIRCUIT

ELECTRONIC VIEWFINDER BLOCK DIAGRAM


A.W.C
D912
L E D
Q801
ZOOM DRIVE
ZOOM
CRT
3
7
4
5
6
1
P
VR901
CONTRAST
Q901
VIDEO AMP
Q902
VIDEO AMP
BRIGHTNESS
VR904
Q904
BLK
NTSC
Q903
SYNC. SEP.
Q906
H AFC
H OSC
Q907
H DRIVE
Q908
H OUT
FLYBACK TRANSFORMER
T901
VR903
FOCUS
Q905
V OSC
IC901
V DRIVE OUT
VR902
V HEIGHT
H & V DEFLECTION YOKE
TALLY
D911
LED
Q9100～Q9102
MULTI VIBRATOR
D811
LED

PRODUCT SAFETY NOTE

The shaded area on this **block diagram** incorporates special features important for protection from X-Radiation, fire and electrical shock hazards when servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the **block diagram**

ORDER NO. VRD-8105-543

Service Manual

Color Video Camera

PK-751

Vol. 4

Schematic Diagrams

SPECIFICATIONS:

Power Source:	DC 12V ± 10% AC 120V ± 10%, 60Hz ± 0.5% (with Power Supply Unit)
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Lens:	6:1 zoom lens with auto/manual iris control. Auto zoom lens and macro construction. F: 1.6, f: 12mm—72mm d: 1m—infinity
Light Sensitivity:	Minimum light intensity on optical image: 80 Lux (F: 1.6) Optimum light intensity on optical image: 90 Lux
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Sync. System:	Internal Sync: RS-170
Signal to Noise Ratio:	Greater than 43dB (luminance signal)
Horizontal Resolution:	More than 240 lines
Color Temperature Control:	2 step switch (indoor, outdoor) & Auto adjust

Microphone:	Condenser Microphone
Audio Output Level:	−20dB, Hi-impedance
Audio Output Impedance:	High impedance (1KΩ)
External Microhpone Input Impedance:	600Ω
Electronic Viewfinder:	Monochrome 1.5 inch CRT
Operating Temperature:	5°C to 40°C
Operating Humidity:	10% to 75%
Operating Position:	Normal position only
Weight:	Camera Head with E.V.F 6.1 lbs (with Lens, 7ft cable & shoulder pad/handle grip) AC adaptor (option) 2.4 lbs
Demensions:	Camera Head with E.V.F 7″(W) × 8″(H) × 13″(D) 177mm(W) × 210mm(H) × 318mm(D) AC adaptor (option) 3″(W) × 3″(H) × 6″(D) 80mm(W) × 75mm(H) × 149mm(D)

Weight and dimensions shown are approximate.
Specifications are subject to change without notice.

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AWC SCHEMATIC DIAGRAM 4-5

AWC CIRCUIT BOARD (VEPW0062) 4-5

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POWER SUPPLY CIRCUIT BOARD (VEPK00468) 4-10

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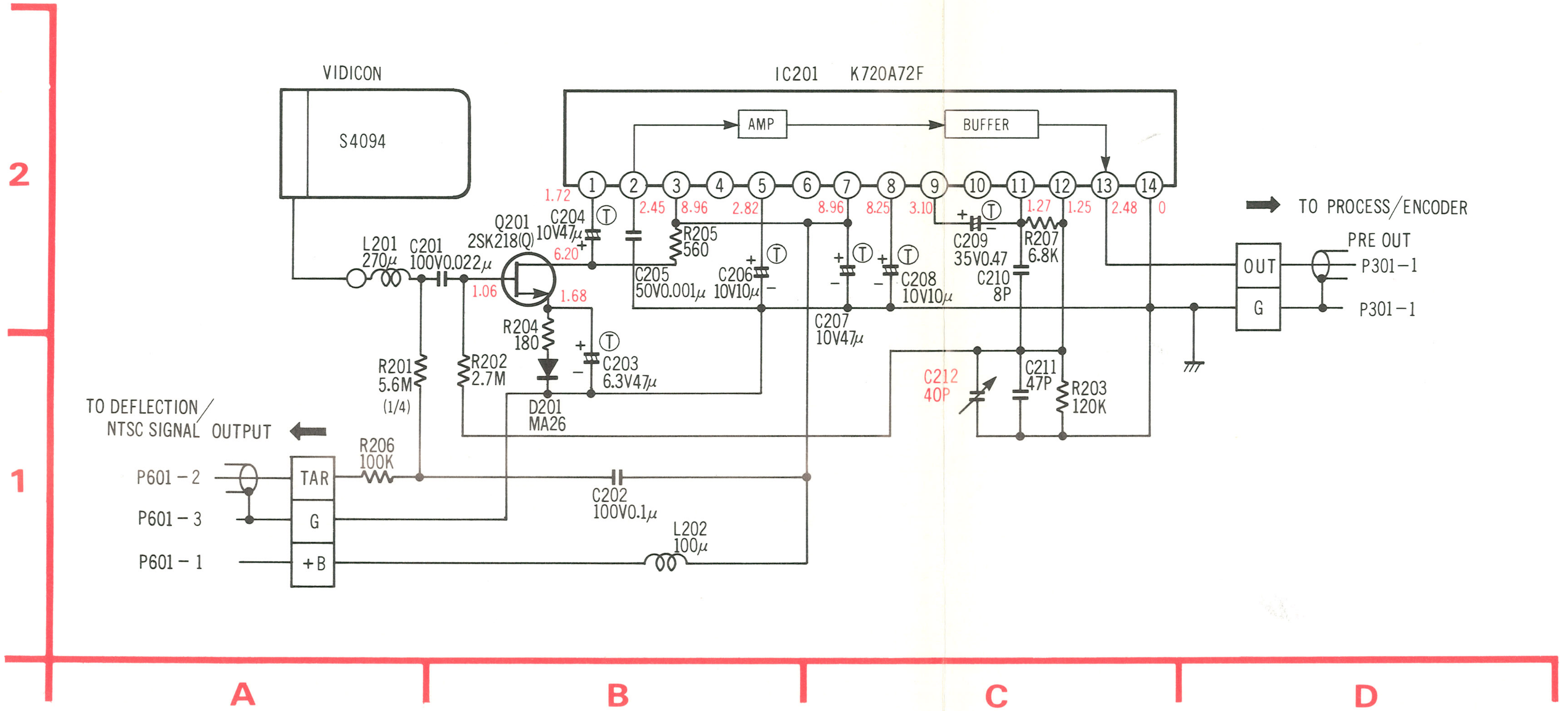
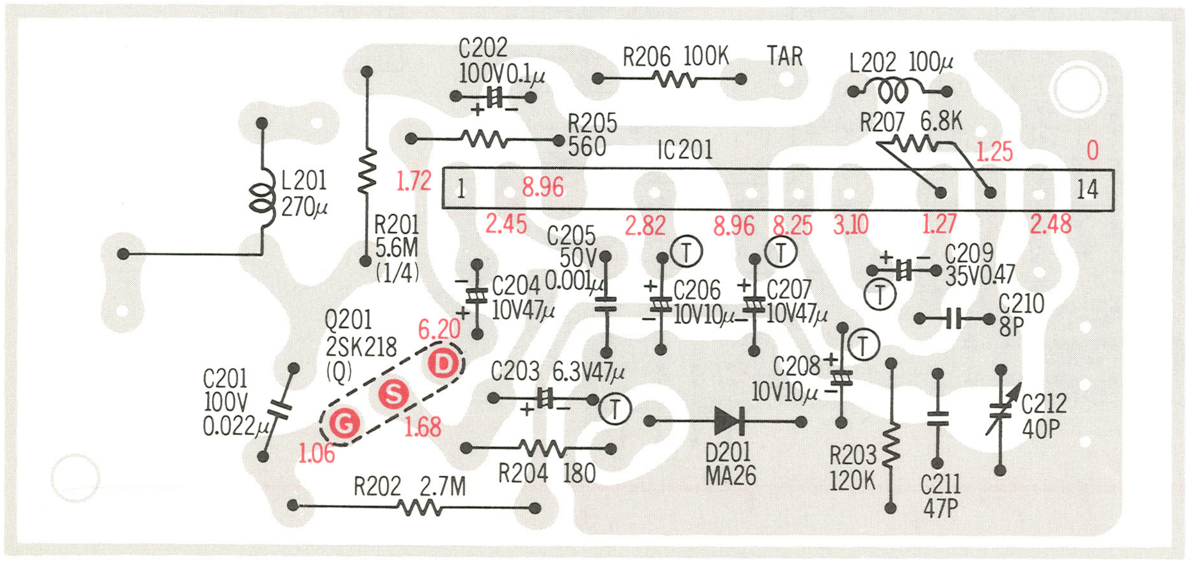
CAMERA UNIT INTERCONNECTION SCHEMATIC DIAGRAM 4-11

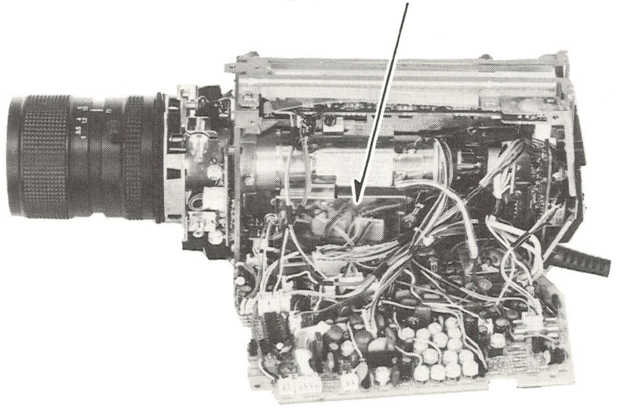
PRE-AMP SCHEMATIC DIAGRAM


VIDICON
S4094
IC201 K720A72F
AMP
BUFFER
1
2
3
4
5
6
7
8
9
10
11
12
13
14
1.72
2.45
8.96
2.82
8.96
8.25
3.10
1.27
1.25
2.48
0
Q201 2SK218(Q)
C204 10V47μ
6.20
1.06
1.68
L201 270μ
C201 100V0.022μ
R205 560
C205 50V0.001μ
C206 10V10μ
C207 10V47μ
C208 10V10μ
C209 35V0.47
R207 6.8K
C210 8P
C211 47P
R203 120K
C212 40P
R204 180
C203 6.3V47μ
D201 MA26
R201 5.6M (1/4)
R202 2.7M
T
TO PROCESS/ENCODER
PRE OUT
OUT
G
P301−1
P301−1
TO DEFLECTION/ NTSC SIGNAL OUTPUT
P601 − 2
P601 − 3
P601 − 1
TAR
G
+B
R206 100K
C202 100V0.1μ
L202 100μ
2
1
A
B
C
D

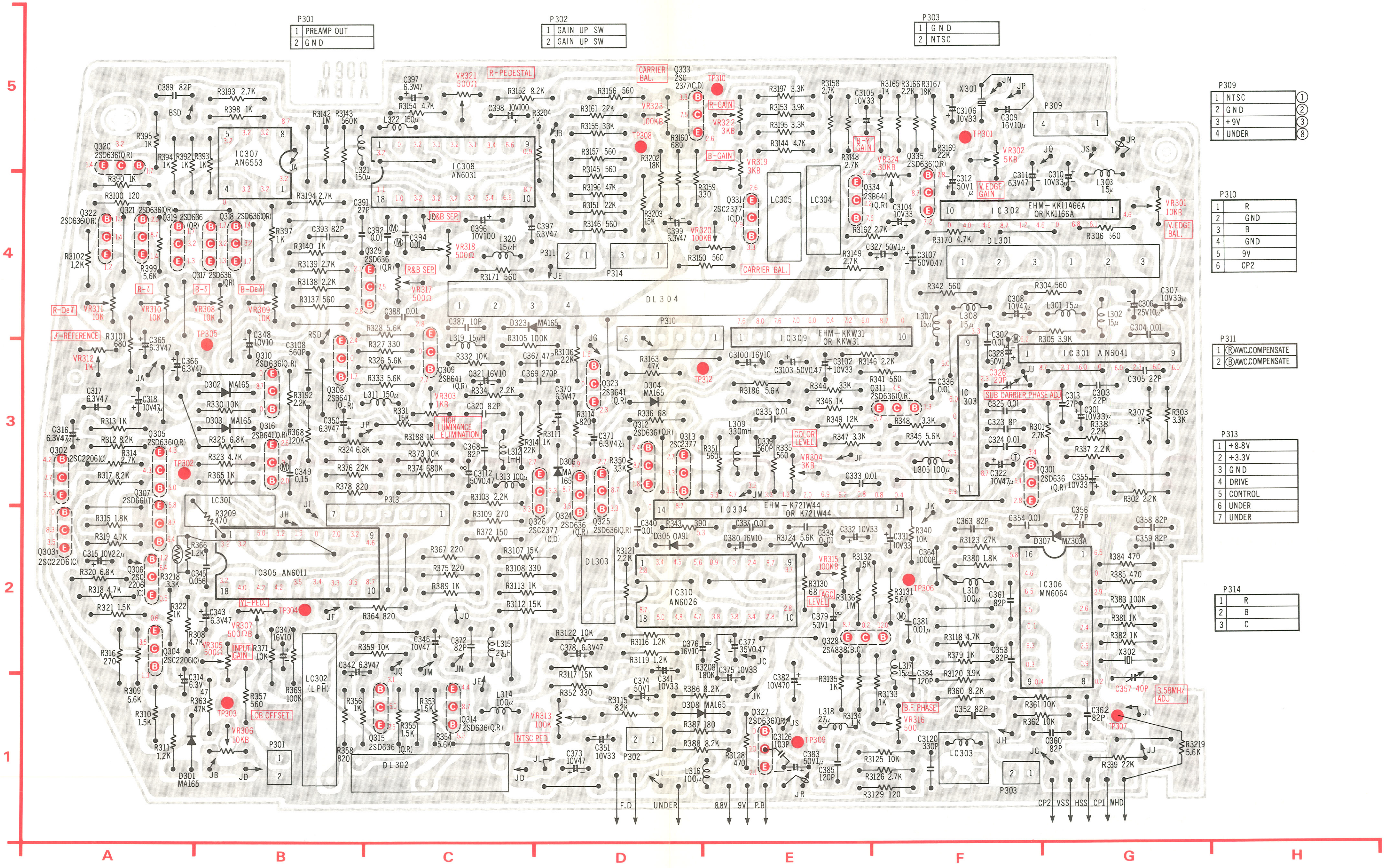
PRE-AMP CIRCUIT BOARD (VEPW0023A)


C202 100V0.1μ
R206 100K
TAR
L202 100μ
R205 560
IC201
R207 6.8K
1.25
0
L201 270μ
1.72
1
8.96
14
R201 5.6M (1/4)
2.45
C205 50V 0.001μ
2.82
8.96
8.25
3.10
1.27
2.48
C209 35V0.47
C204 10V47μ
C206 10V10μ
C207 10V47μ
C210 8P
Q201 2SK218 (Q)
6.20
D
S
G
1.68
1.06
C201 100V 0.022μ
C203 6.3V47μ
C208 10V10μ
C212 40P
T
R204 180
D201 MA26
R203 120K
C211 47P
R202 2.7M

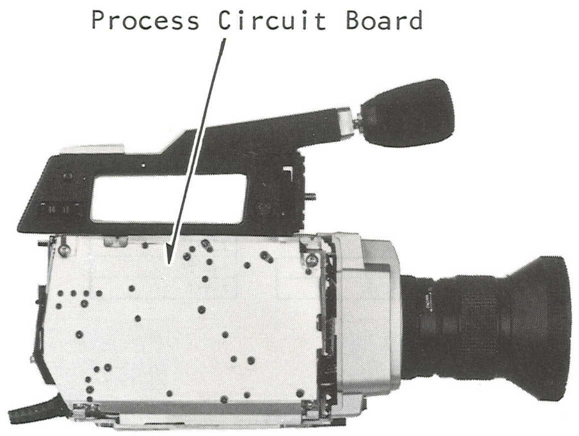
Pre-Amp Circuit Board

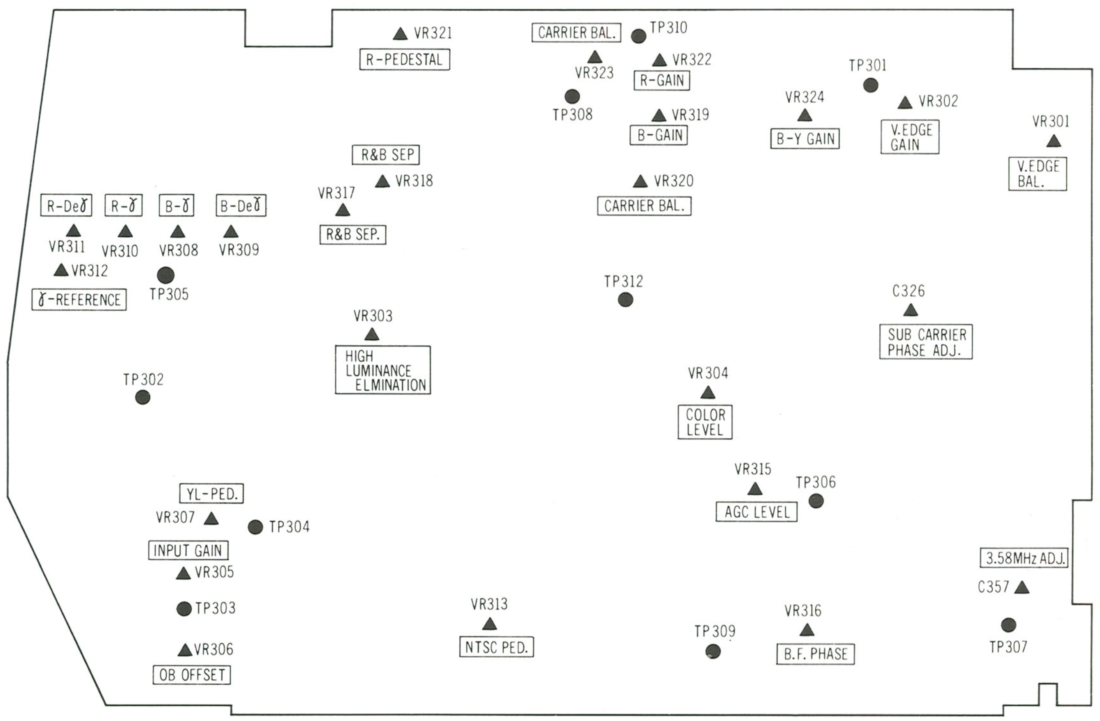


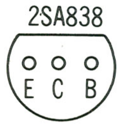
PROCESS CIRCUIT BOARD (VEPW0060)

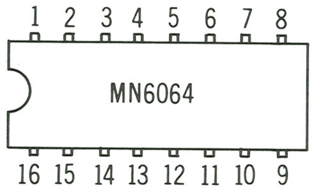

P301
1 PREAMP OUT
2 GND
P302
1 GAIN UP SW
2 GAIN UP SW
P303
1 GND
2 NTSC
P309
1 NTSC ①
2 GND ②
3 +9V ③
4 UNDER ⑧
P310
1 R
2 GND
3 B
4 GND
5 9V
6 CP2
P311
1 Ⓡ AWC.COMPENSATE
2 Ⓑ AWC.COMPENSATE
P313
1 +8.8V
2 +3.3V
3 GND
4 DRIVE
5 CONTROL
6 UNDER
7 UNDER
P314
1 R
2 B
3 C
F.D
UNDER
8.8V
9V
P.B
CP2
VSS
HSS
CP1
WHD
5
4
3
2
1
A
B
C
D
E
F
G
H

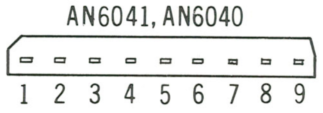
IC301	G-3
IC302	G-4
IC303	F-3
IC304	E-2
IC305	B-2
IC306	G-2
IC307	B-5
IC308	C-4
IC309	E-4
IC310	E-2
Q301	F-3
Q302	A-3
Q303	A-2
Q304	A-2
Q305	A-3
Q306	A-2
Q307	A-2
Q308	B-3
Q309	C-3
Q310	B-3
Q311	F-3
Q312	D-3
Q313	D-3
Q314	C-1
Q315	C-1
Q316	B-3
Q317	B-4
Q318	B-4
Q319	A-4
Q320	A-5
Q321	A-4
Q322	A-4
Q323	D-3
Q324	D-3
Q325	D-3
Q326	D-3
Q327	E-1
Q328	E-2
Q329	C-4
Q331	E-4
Q333	D-5
Q334	E-4
Q335	F-4
VR301	G-4
VR302	F-5
VR303	C-3
VR304	E-3
VR305	B-2
VR306	B-1
VR307	B-2
VR308	B-4
VR309	B-4
VR310	A-4
VR311	A-4
VR312	A-3
VR313	D-1
VR315	E-2
VR316	F-1
VR317	C-4
VR318	C-4
VR319	E-4
VR320	E-4
VR321	C-5
VR322	E-5
VR323	D-5
VR324	F-4

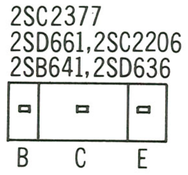

Process Circuit Board

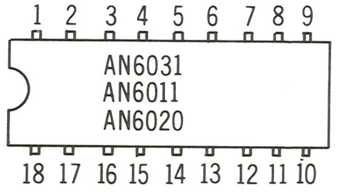

VR321
R-PEDESTAL
CARRIER BAL.
TP310
VR322
VR323
R-GAIN
TP308
VR319
B-GAIN
VR324
B-Y GAIN
TP301
VR302
V.EDGE GAIN
VR301
V.EDGE BAL.
R&B SEP.
VR318
VR317
R&B SEP.
VR320
CARRIER BAL.
R-Deγ
R-γ
B-γ
B-Deγ
VR311
VR310
VR308
VR309
VR312
γ-REFERENCE
TP305
TP312
C326
SUB CARRIER PHASE ADJ.
VR303
HIGH LUMINANCE ELMINATION
TP302
VR304
COLOR LEVEL
VR315
TP306
AGC LEVEL
YL-PED.
VR307
TP304
INPUT GAIN
VR305
TP303
VR306
OB OFFSET
VR313
NTSC PED.
TP309
VR316
B.F. PHASE
3.58MHz ADJ.
C357
TP307




1 2 3 4 5 6 7 8
MN6064
16 15 14 13 12 11 10 9


AN6041, AN6040
1 2 3 4 5 6 7 8 9


2SC2377
2SD661, 2SC2206
2SB641, 2SD636
B C E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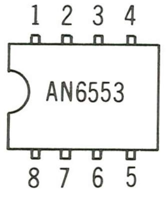
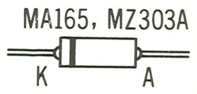
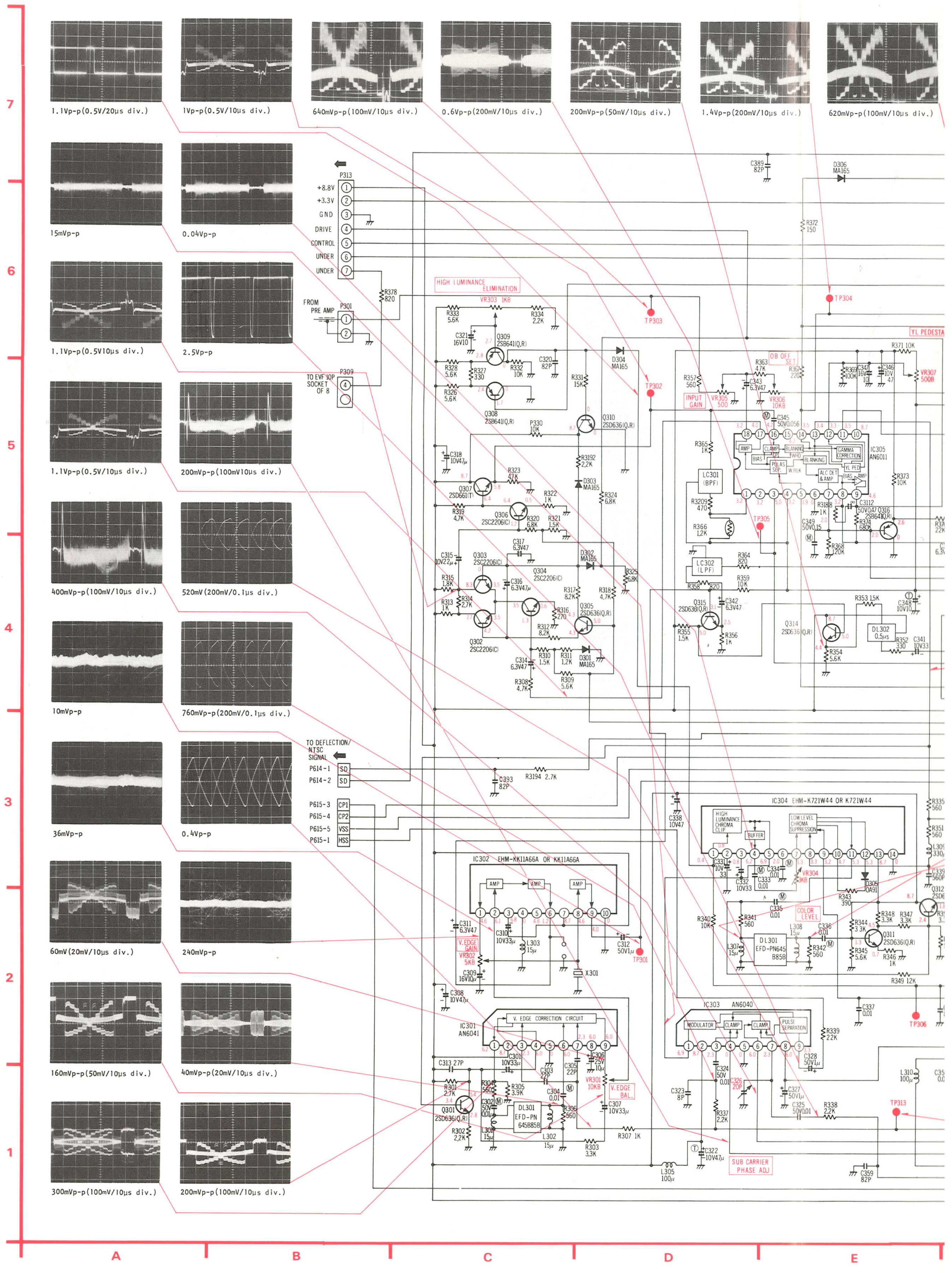
AN6031
AN6011
AN6020
18 17 16 15 14 13 12 11 10

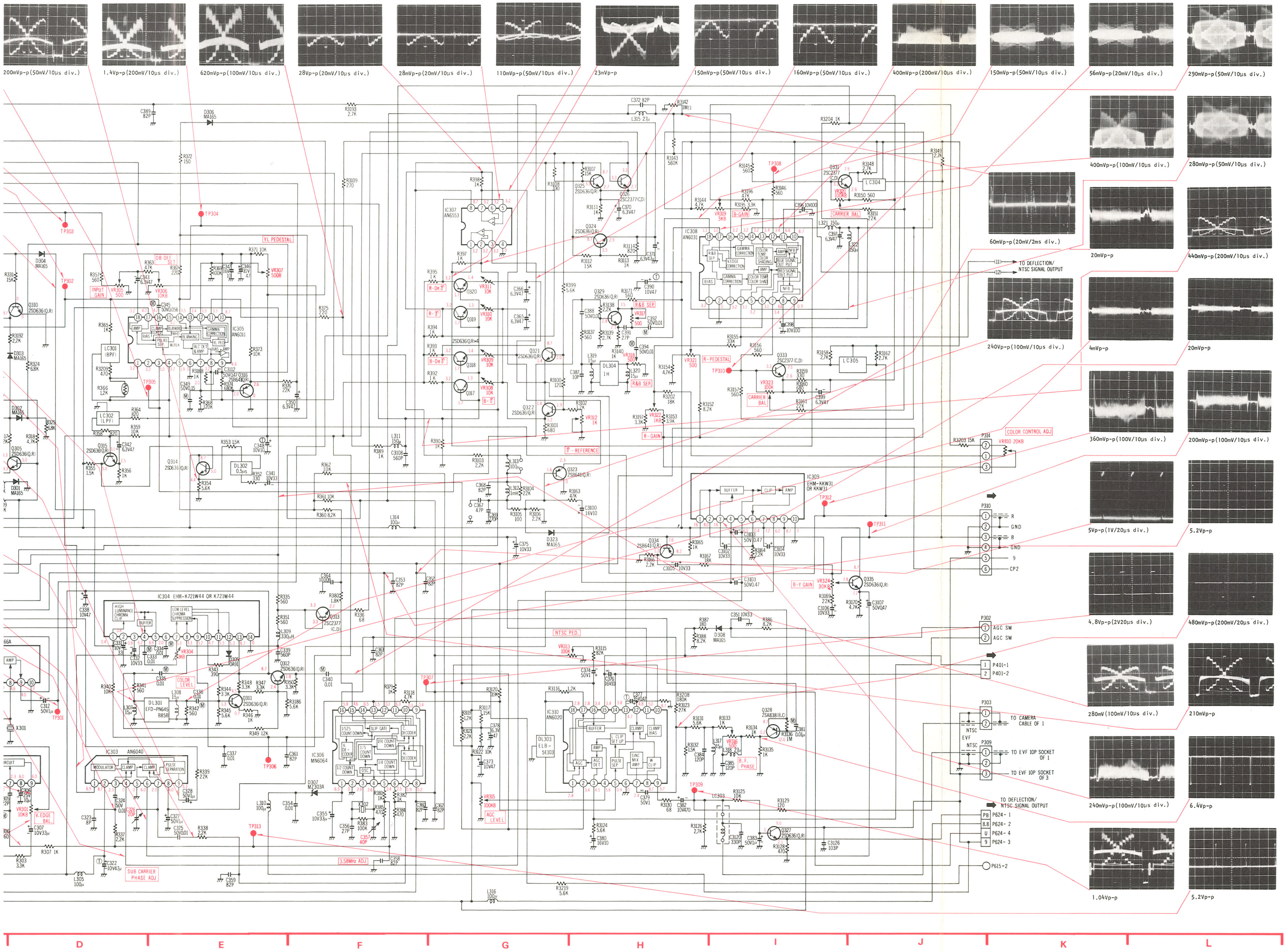

1 2 3 4
AN6553
8 7 6 5


MA165, MZ303A
K A

PROCESS SCHEMATIC DIAGRAM


1.1Vp-p(0.5V/20µs div.)
1Vp-p(0.5V/10µs div.)
640mVp-p(100mV/10µs div.)
0.6Vp-p(200mV/10µs div.)
200mVp-p(50mV/10µs div.)
1.4Vp-p(200mV/10µs div.)
620mVp-p(100mV/10µs div.)
15mVp-p
0.04Vp-p
1.1Vp-p(0.5V10µs div.)
2.5Vp-p
1.1Vp-p(0.5V/10µs div.)
200mVp-p(100mV10µs div.)
400mVp-p(100mV/10µs div.)
520mV(200mV/0.1µs div.)
10mVp-p
760mVp-p(200mV/0.1µs div.)
36mVp-p
0.4Vp-p
60mV(20mV/10µs div.)
240mVp-p
160mVp-p(50mV/10µs div.)
40mVp-p(20mV/10µs div.)
300mVp-p(100mV/10µs div.)
200mVp-p(100mV/10µs div.)
P313
+8.8V
+3.3V
GND
DRIVE
CONTROL
UNDER
UNDER
FROM PRE AMP
P301
TO EVF 10P SOCKET OF 8
P309
TO DEFLECTION/NTSC SIGNAL
P614-1
P614-2
P615-3
P615-4
P615-5
P615-1
HIGH LUMINANCE ELIMINATION
YL PEDESTAL
INPUT GAIN
IC302 EHM-KK11A66A OR KK11A66A
IC304 EHM-K721W44 OR K721W44
IC301 AN6041
V. EDGE CORRECTION CIRCUIT
IC303 AN6040
SUB CARRIER PHASE ADJ
TP301
TP302
TP303
TP304
TP305
TP306
TP313
7
6
5
4
3
2
1
A
B
C
D
E

AM

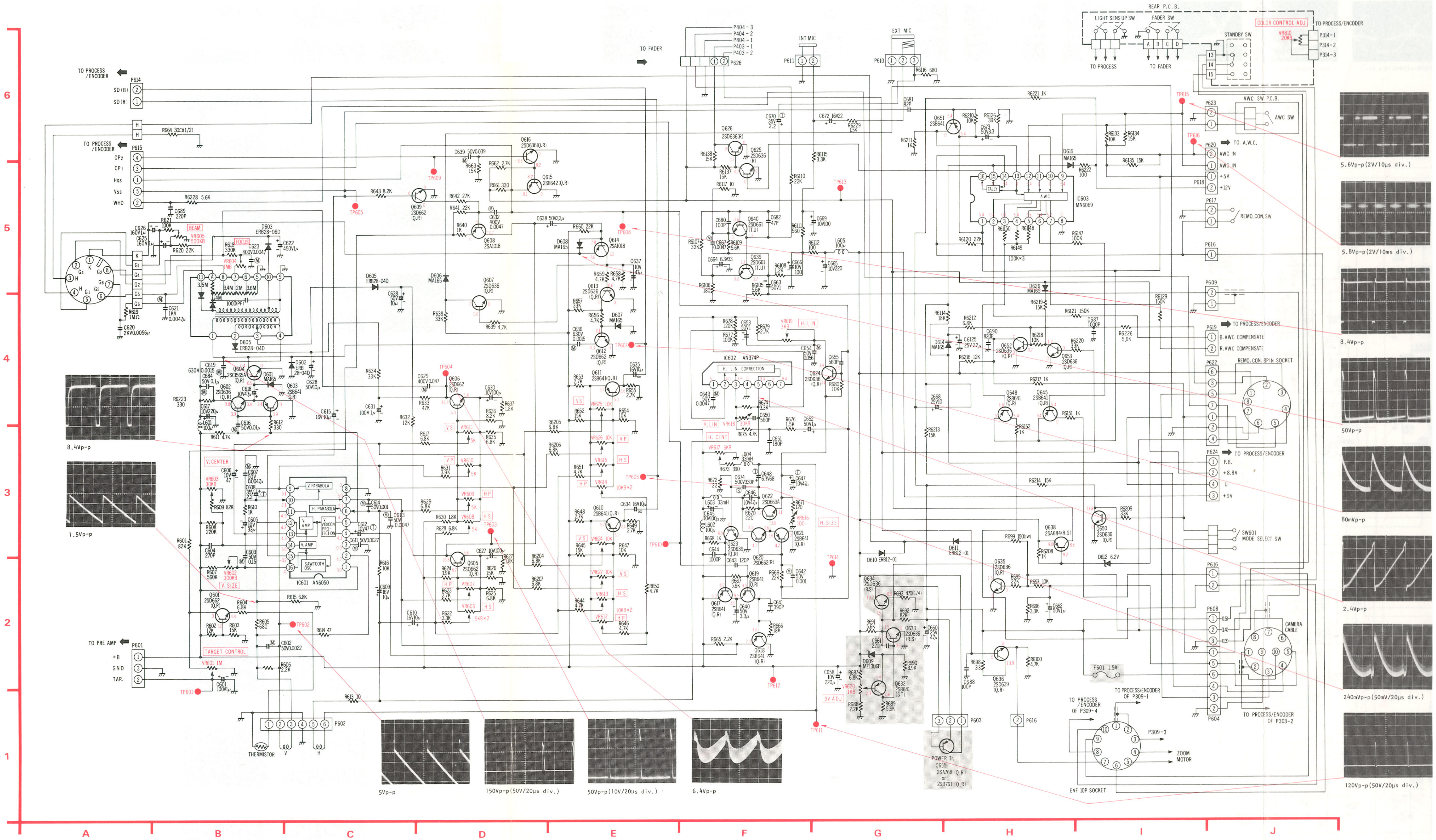


200mVp-p(50mV/10µs div.)
1.4Vp-p(200mV/10µs div.)
620mVp-p(100mV/10µs div.)
28Vp-p(200mV/10µs div.)
28mVp-p(20mV/10µs div.)
110mVp-p(50mV/10µs div.)
23mVp-p
150mVp-p(50mV/10µs div.)
160mVp-p(50mV/10µs div.)
400mVp-p(200mV/10µs div.)
150mVp-p(50mV/10µs div.)
56mVp-p(20mV/10µs div.)
290mVp-p(50mV/10µs div.)
400mVp-p(100mV/10µs div.)
280mVp-p(50mV/10µs div.)
60mVp-p(20mV/2ms div.)
20mVp-p
440mVp-p(200mV/10µs div.)
240Vp-p(100mV/10µs div.)
4mVp-p
20mVp-p
360mVp-p(100V/10µs div.)
200mVp-p(100mV/10µs div.)
5Vp-p(1V/20µs div.)
5.2Vp-p
4.8Vp-p(2V20µs div.)
480mVp-p(200mV/20µs div.)
280mV(100mV/10µs div.)
210mVp-p
240mVp-p(100mV/10µs div.)
6.4Vp-p
1.04Vp-p
5.2Vp-p
TO DEFLECTION/ NTSC SIGNAL OUTPUT
TO CAMERA CABLE OF 1
TO EVF 10P SOCKET OF 1
TO EVF 10P SOCKET OF 3
TO DEFLECTION/ NTSC SIGNAL OUTPUT
COLOR CONTROL ADJ
D
E
F
G
H
I
J
K
L

VR301	V. EDGE BAL.	D-1
VR302	V. EDGE GAIN	C-2
VR303	HIGH LUMINANCE ELIMINATION	C-6
VR304	COLOR LEVEL	E-3
VR305	INPUT GAIN	D-5
VR306	OB OFFSET	E-5
VR307	YL PEDESTAL	E-5
VR308	B - γ	G-5
VR309	B - DE γ	G-5
VR310	R - γ	G-5
VR311	R - DE γ	G-5
VR312	γ - REFERENCE	H-4
VR313	NTSC PED	H-3
VR315	AGC LEVEL	G-2
VR316	B.F. PHASE	I-2
VR317	R&B SEP.	H-5
VR318	R&B SEP.	H-5
VR319	B - GAIN	I-6
VR320	CARRIER BAL	I-6
VR321	R - PEDESTAL	H-5
VR322	R - GAIN	H-4
VR323	CARRIER BAL	I-5
VR324	B-Y GAIN	I-3
C326	SUB CARRIER PHASE ADJ.	D-1
C357	3.58MHz ADJ	F-1

DEFLECTION SCHEMATIC DIAGRAM

VR601	TARGET CONTROL	B-2
VR602	V. SIZE	B-2
VR603	V. CENTER	B-3
VR604	FOCUS	B-5
VR605	BEAM	C-5
VR606	HS	D-2
VR607	HP	D-2
VR608	HS	D-3
VR609	HP	D-3
VR610	VP	D-3
VR611	VS	D-3
VR612	HP	E-2
VR613	HS	E-2
VR616	H. SIZE	F-3
VR617	H. CENTER	F-3
VR618	H. LIN	F-4
VR619	H. LIN	F-4
VR620	9V ADJ	G-2

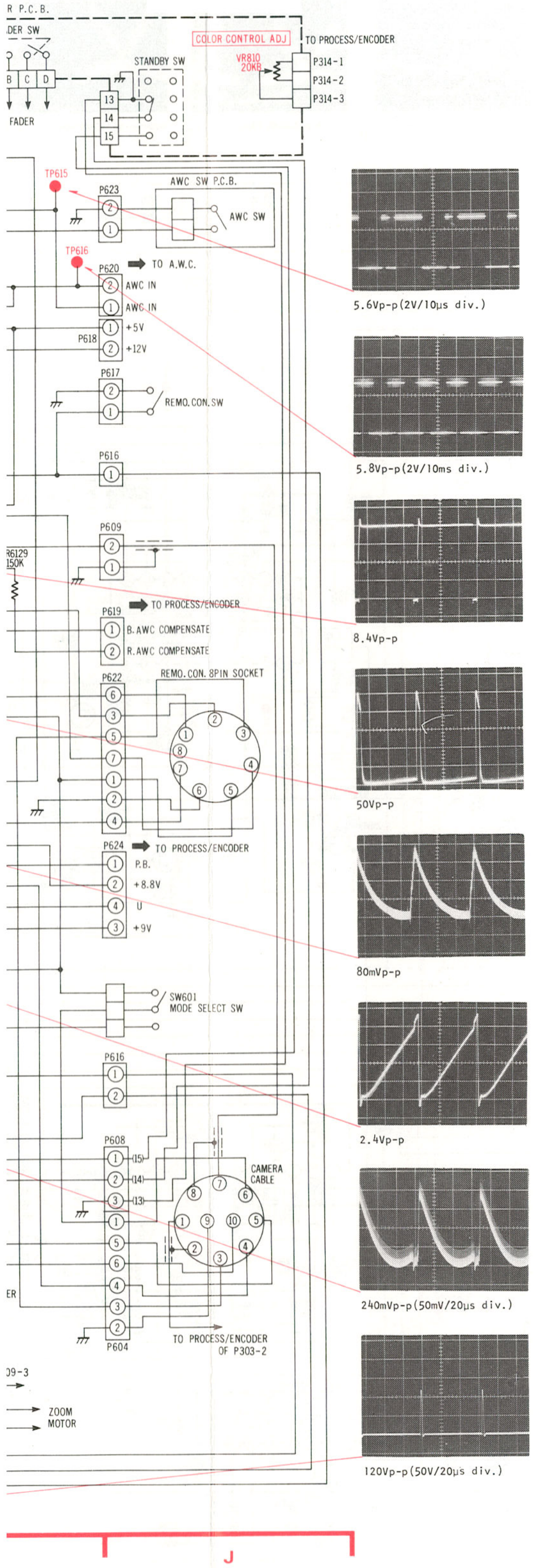


TO PROCESS /ENCODER
TO FADER
INT MIC
EXT MIC
REAR P.C.B.
LIGHT SENS UP SW
FADER SW
STANDBY SW
COLOR CONTROL ADJ
TO PROCESS/ENCODER
AWC SW P.C.B.
AWC SW
TO A.W.C.
REMO.CON.SW
B.AWC COMPENSATE
R.AWC COMPENSATE
REMO.CON.8PIN SOCKET
SW601 MODE SELECT SW
CAMERA CABLE
TO PROCESS/ENCODER OF P309-1
TO PROCESS/ENCODER OF P309-4
TO PROCESS/ENCODER OF P303-2
ZOOM MOTOR
EVF 10P SOCKET
POWER Tr. Q655 2SA768 (Q,R) or 2SB761 (Q,R)
IC601 AN6050
IC602 AN374P
IC603 MN6069
TO PRE AMP
THERMISTOR
8.4Vp-p
1.5Vp-p
5Vp-p
150Vp-p(50V/20μs div.)
50Vp-p(10V/20μs div.)
6.4Vp-p
5.6Vp-p(2V/10μs div.)
5.8Vp-p(2V/10ms div.)
8.4Vp-p
50Vp-p
80mVp-p
2.4Vp-p
240mVp-p(50mV/20μs div.)
120Vp-p(50V/20μs div.)
1
2
3
4
5
6
A
B
C
D
E
F
G
H
I
J

PRODUCT SAFETY NOTE

The shaded area on this schematic diagram incorporates special features important for protection from X-Radiation, fire and electrical shock hazards when servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

DEFLECTION CIRCUIT BOARD (VEPW0061)


COLOR CONTROL ADJ
VR810 20KB
TO PROCESS/ENCODER
P314-1
P314-2
P314-3
STANDBY SW
FADER
TP615
TP616
P623
AWC SW P.C.B.
AWC SW
P620
TO A.W.C.
AWC IN
AWC IN
P618
+5V
+12V
P617
REMO.CON.SW
P616
P609
P619
TO PROCESS/ENCODER
B.AWC COMPENSATE
R.AWC COMPENSATE
P622
REMO.CON. 8PIN SOCKET
P624
TO PROCESS/ENCODER
P.B.
+8.8V
U
+9V
SW601
MODE SELECT SW
P608
CAMERA CABLE
P604
TO PROCESS/ENCODER OF P303-2
ZOOM MOTOR
J
5.6Vp-p(2V/10μs div.)
5.8Vp-p(2V/10ms div.)
8.4Vp-p
50Vp-p
80mVp-p
2.4Vp-p
240mVp-p(50mV/20μs div.)
120Vp-p(50V/20μs div.)

P601

1	+9V
2	TARGET CONTROL
3	G N D

P602

1	THERMISTOR
2	V.DEF. COIL(L)
3	V.DEF. COIL(H)
4	G N D
5	H.DEF. COIL(L)
6	H.DEF. COIL(H)

P603

1	Q655(C)
2	Q655(E)
3	Q655(B)

P604

1	REMO.CON. OUT
2	G N D
3	TC REMO. CON.
4	RESET IN
5	STANDBY OUT
6	+12V

P608

1	+12V
2	⑤
3	G N D

P609

1	G N D
2	AUDIO OUT

P610

1	G N D
2	EXT. MIC
3	G N D

P611

1	G N D
2	MIC. IN

P614

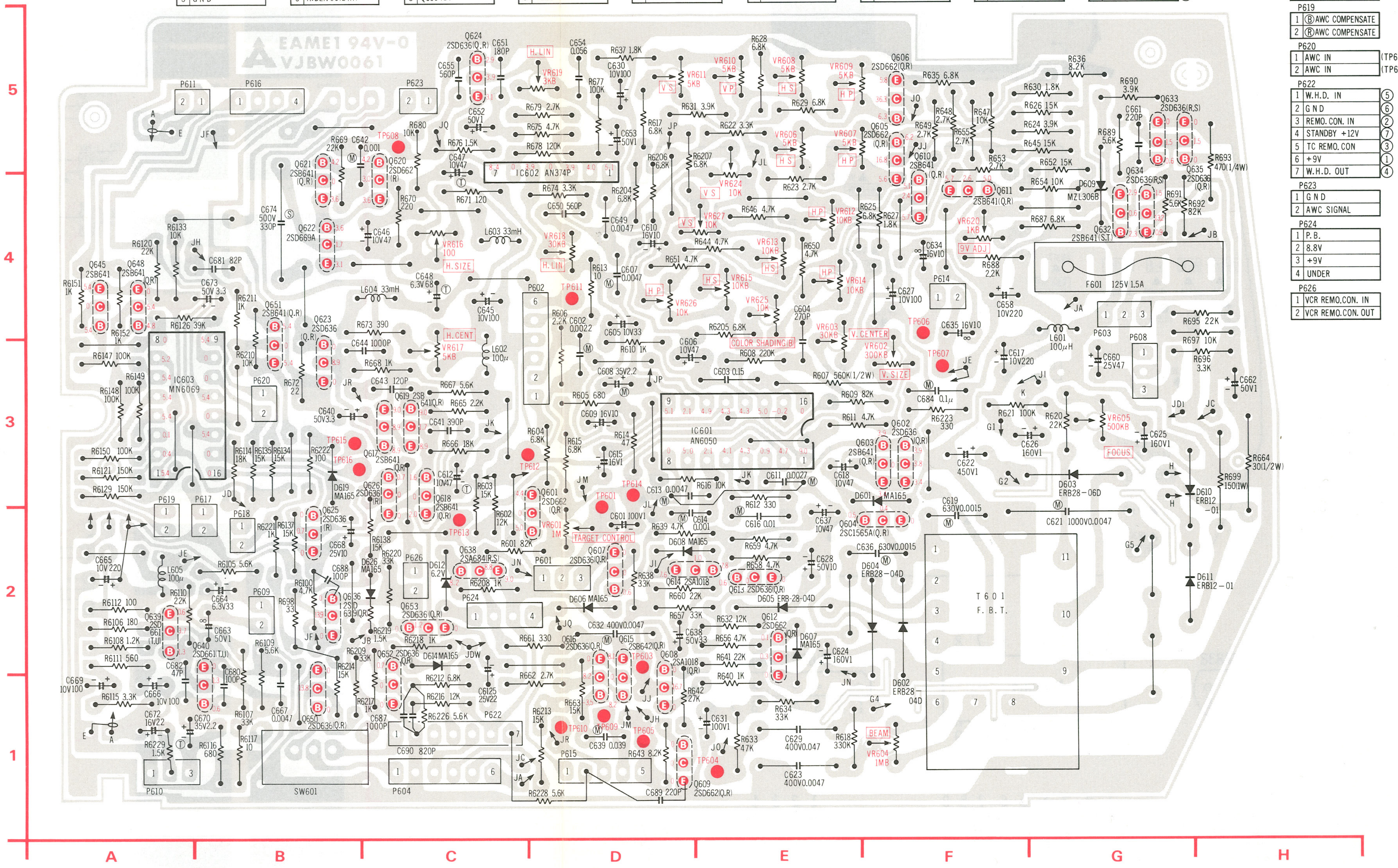
1	SD(R)
2	SD(B)

P615

1	Hss
2	W.H.D.
3	CP1
4	CP2
5	Vss

P616

1	REMO. CON.	⑥
2	TALLY	⑦
3	AWC(OK)	⑩
4	AWC(OK)	⑨


EAME1 94V-0
VJBW0061
5
4
3
2
1
A
B
C
D
E
F
G
H
IC602 AN374P
IC603 MN6069
IC601 AN6050
F601 125V 1.5A
T601 F.B.T.
H.LIN
H.SIZE
H.CENT
V.S
V.P
H.S
H.P
V.SIZE
V.CENTER
COLOR SHADING(B)
TARGET CONTROL
9V ADJ
FOCUS
BEAM
VR605 500KB
VR604 1M8
TP601
TP603
TP604
TP605
TP606
TP607
TP608
TP609
TP610
TP611
TP612
TP613
TP614
TP615
TP616
SW601
P601
P602
P603
P604
P608
P609
P610
P611
P614
P615
P616
P617
P618
P619
P620
P622
P623
P624
P626

P617

1	REMO. CON. SW
2	G N D

P618

1	+5V
2	+12V

P619

1	Ⓑ AWC COMPENSATE
2	Ⓡ AWC COMPENSATE

P620

1	AWC IN	(TP615)
2	AWC IN	(TP616)

P622

1	W.H.D. IN	⑤
2	G N D	⑥
3	REMO. CON. IN	②
4	STANDBY +12V	⑦
5	TC REMO. CON	③
6	+9V	①
7	W.H.D. OUT	④

P623

1	G N D
2	AWC SIGNAL

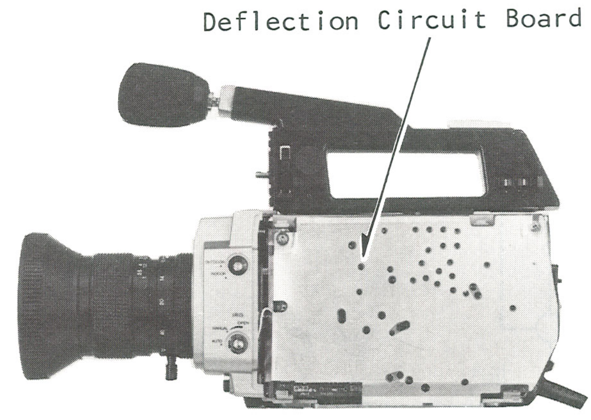
P624

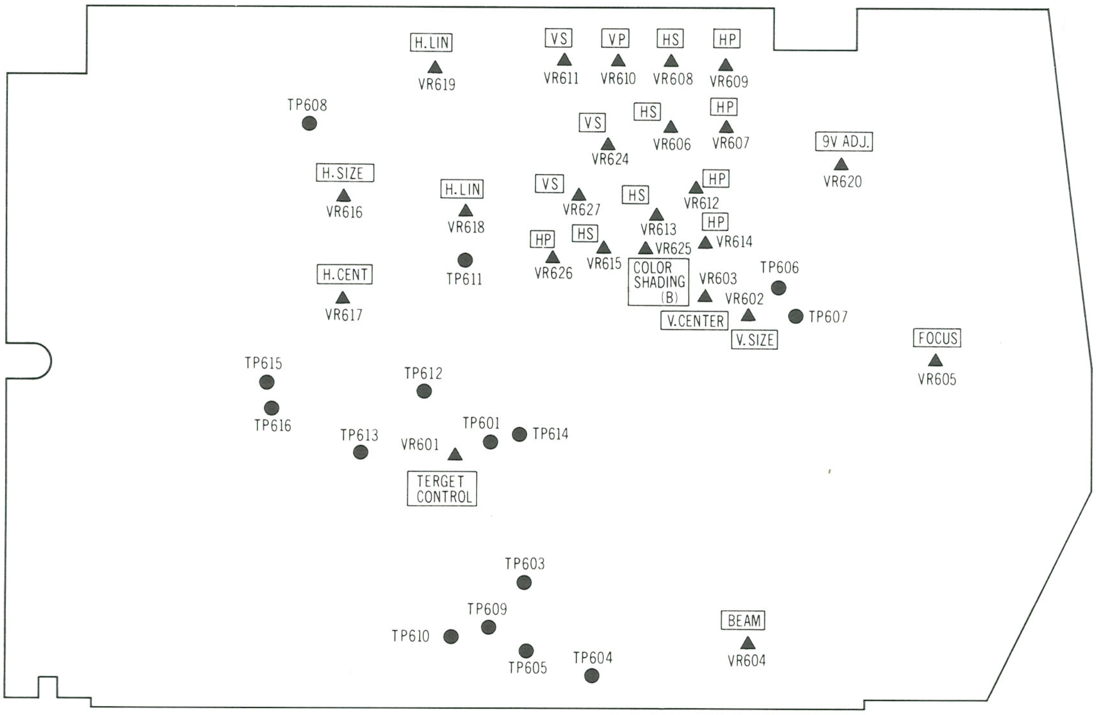
1	P.B.
2	8.8V
3	+9V
4	UNDER

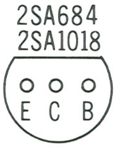
P626

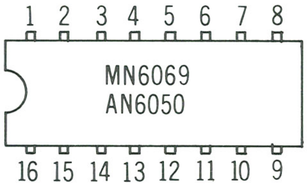
1	VCR REMO.CON. IN
2	VCR REMO.CON. OUT

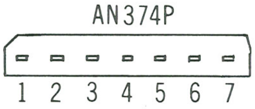
IC601	E-3
IC602	D-4
IC603	A-3
Q601	D-2
Q602	F-3
Q603	F-3
Q604	F-2
Q605	F-5
Q606	F-5
Q607	D-2
Q608	D-1
Q609	D-1
Q610	F-4
Q611	F-4
Q612	E-2
Q613	E-2
Q614	D-2
Q615	D-1
Q616	D-1
Q617	C-3
Q618	C-3
Q619	C-3
Q620	C-4
Q621	B-4
Q622	B-4
Q623	B-3
Q624	C-5
Q625	B-2
Q626	C-3
Q632	G-4
Q633	G-5
Q634	G-4
Q635	G-5
Q636	B-2
Q638	C-2
Q639	A-2
Q640	B-1
Q645	A-4
Q648	A-4
Q650	B-1
Q651	B-3
Q652	C-1
Q653	C-2
VR601	D-2
VR602	F-3
VR603	E-3
VR604	F-1
VR605	G-3
VR606	E-5
VR607	F-5
VR608	E-5
VR609	F-5
VR610	E-5
VR611	D-5
VR612	E-4
VR613	E-4
VR614	E-4
VR615	E-4
VR616	C-4
VR617	C-3
VR618	D-4
VR619	D-5
VR620	F-4
VR624	E-5
VR625	E-4
VR626	D-4
VR627	E-4

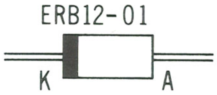

Deflection Circuit Board

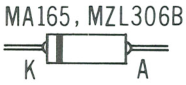

H.LIN
VR619
VS
VR611
VP
VR610
HS
VR608
HP
VR609
TP608
VS
VR624
HS
VR606
HP
VR607
9V ADJ.
VR620
H.SIZE
VR616
H.LIN
VR618
VS
VR627
HS
VR613
HP
VR612
HP
VR626
HS
VR615
VR625
HP
VR614
H.CENT
VR617
TP611
COLOR SHADING (B)
VR603
VR602
TP606
TP607
V.CENTER
V.SIZE
FOCUS
VR605
TP615
TP616
TP612
TP613
VR601
TP601
TP614
TERGET CONTROL
TP603
TP609
TP610
TP605
TP604
BEAM
VR604

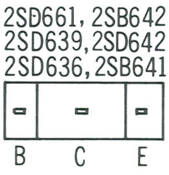

2SA684
2SA1018
E C B

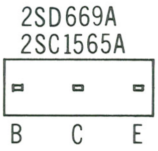

1 2 3 4 5 6 7 8
MN6069
AN6050
16 15 14 13 12 11 10 9

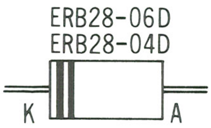

AN374P
1 2 3 4 5 6 7



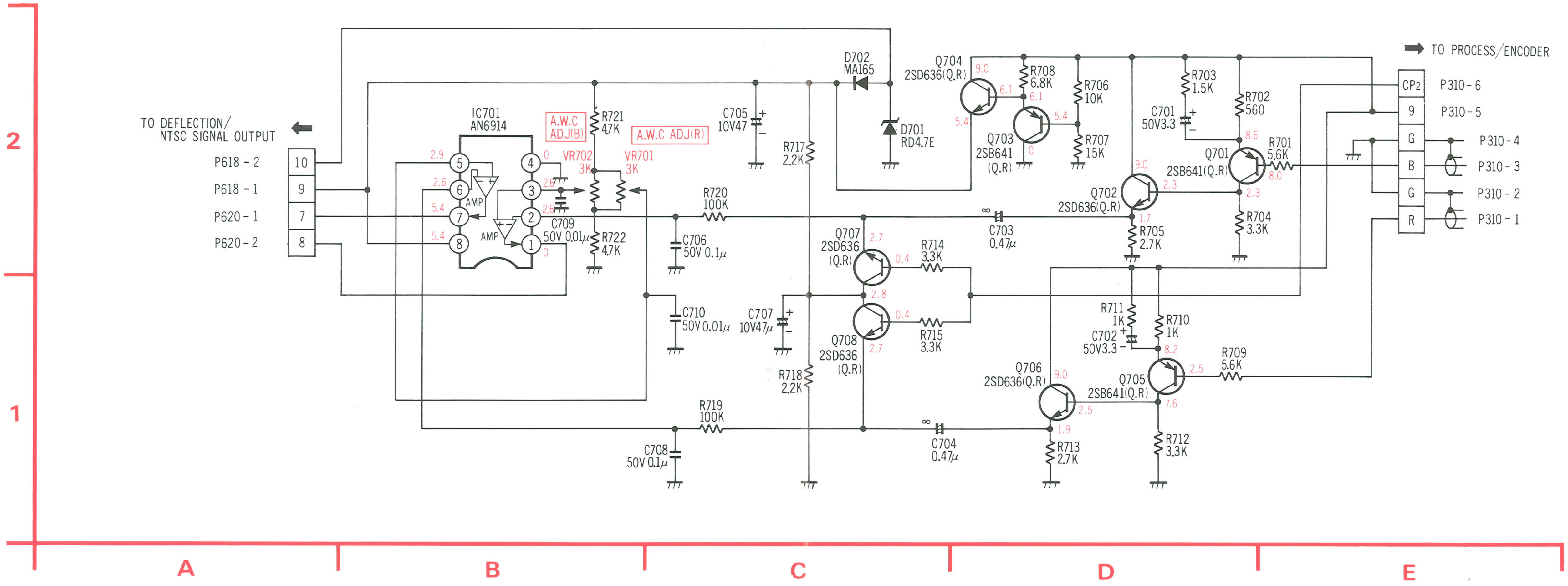

MA165, MZL306B
K
A


2SD661, 2SB642
2SD639, 2SD642
2SD636, 2SB641
B C E

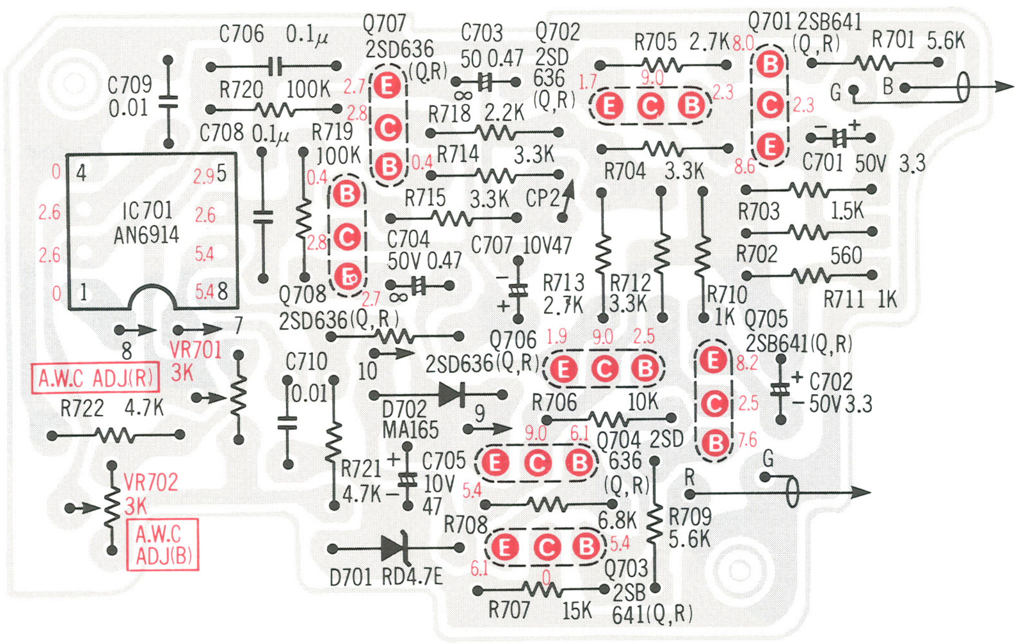

2SD669A
2SC1565A
B C E

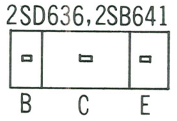

ERB28-06D
ERB28-04D
K
A

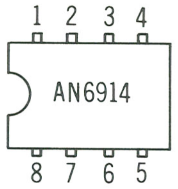
AWC SCHEMATIC DIAGRAM

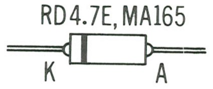

2
1
A
B
C
D
E
TO DEFLECTION/ NTSC SIGNAL OUTPUT
P618 - 2
P618 - 1
P620 - 1
P620 - 2
10
9
7
8
IC701 AN6914
AMP
A.W.C ADJ(B)
A.W.C ADJ(R)
VR702 3K
VR701 3K
R721 47K
R722 4.7K
C709 50V 0.01μ
C705 10V47
R717 2.2K
R720 100K
C706 50V 0.1μ
C710 50V 0.01μ
C707 10V47μ
R718 2.2K
R719 100K
C708 50V 0.1μ
D702 MA165
D701 RD4.7E
Q704 2SD636(Q,R)
Q703 2SB641 (Q,R)
R708 6.8K
R706 10K
R707 15K
Q707 2SD636 (Q,R)
Q708 2SD636 (Q,R)
R714 3.3K
R715 3.3K
C703 0.47μ
C704 0.47μ
Q702 2SD636(Q,R)
R705 2.7K
C701 50V3.3
R703 1.5K
R702 560
Q701 2SB641(Q,R)
R701 5.6K
R704 3.3K
R711 1K
R710 1K
C702 50V3.3
Q706 2SD636(Q,R)
Q705 2SB641(Q,R)
R709 5.6K
R713 2.7K
R712 3.3K
TO PROCESS/ENCODER
CP2
P310 - 6
P310 - 5
P310 - 4
P310 - 3
P310 - 2
P310 - 1
G
B
G
R

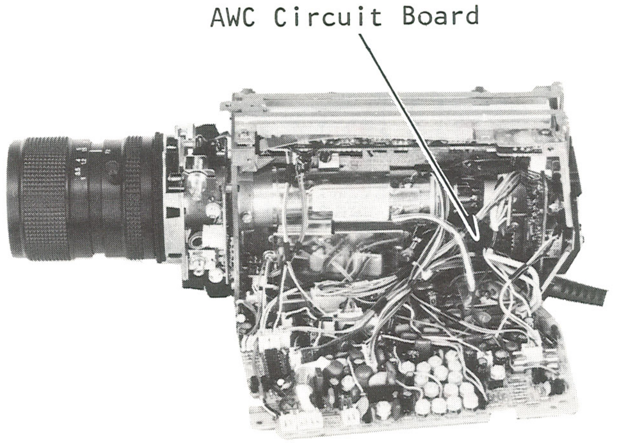
AWC CIRCUIT BOARD (VEPW0062)


C706 0.1μ
C709 0.01
R720 100K
C708 0.1μ
R719 100K
Q707 2SD636 (Q,R)
C703 50 0.47
Q702 2SD 636 (Q,R)
R718 2.2K
R714 3.3K
R715 3.3K
CP2
R705 2.7K
Q701 2SB641 (Q,R)
R701 5.6K
R704 3.3K
C701 50V 3.3
R703 1.5K
R702 560
R711 1K
IC701 AN6914
C704 50V 0.47
C707 10V47
R713 2.7K
R712 3.3K
R710 1K
Q705 2SB641(Q,R)
C702 50V3.3
Q708 2SD636(Q,R)
Q706 2SD636(Q,R)
VR701 3K
A.W.C ADJ(R)
R722 4.7K
C710 0.01
D702 MA165
R706 10K
Q704 2SD 636 (Q,R)
R721 4.7K
C705 10V 47
R708 6.8K
R709 5.6K
VR702 3K
A.W.C ADJ(B)
D701 RD4.7E
R707 15K
Q703 2SB 641(Q,R)
E
C
B
G
B
R

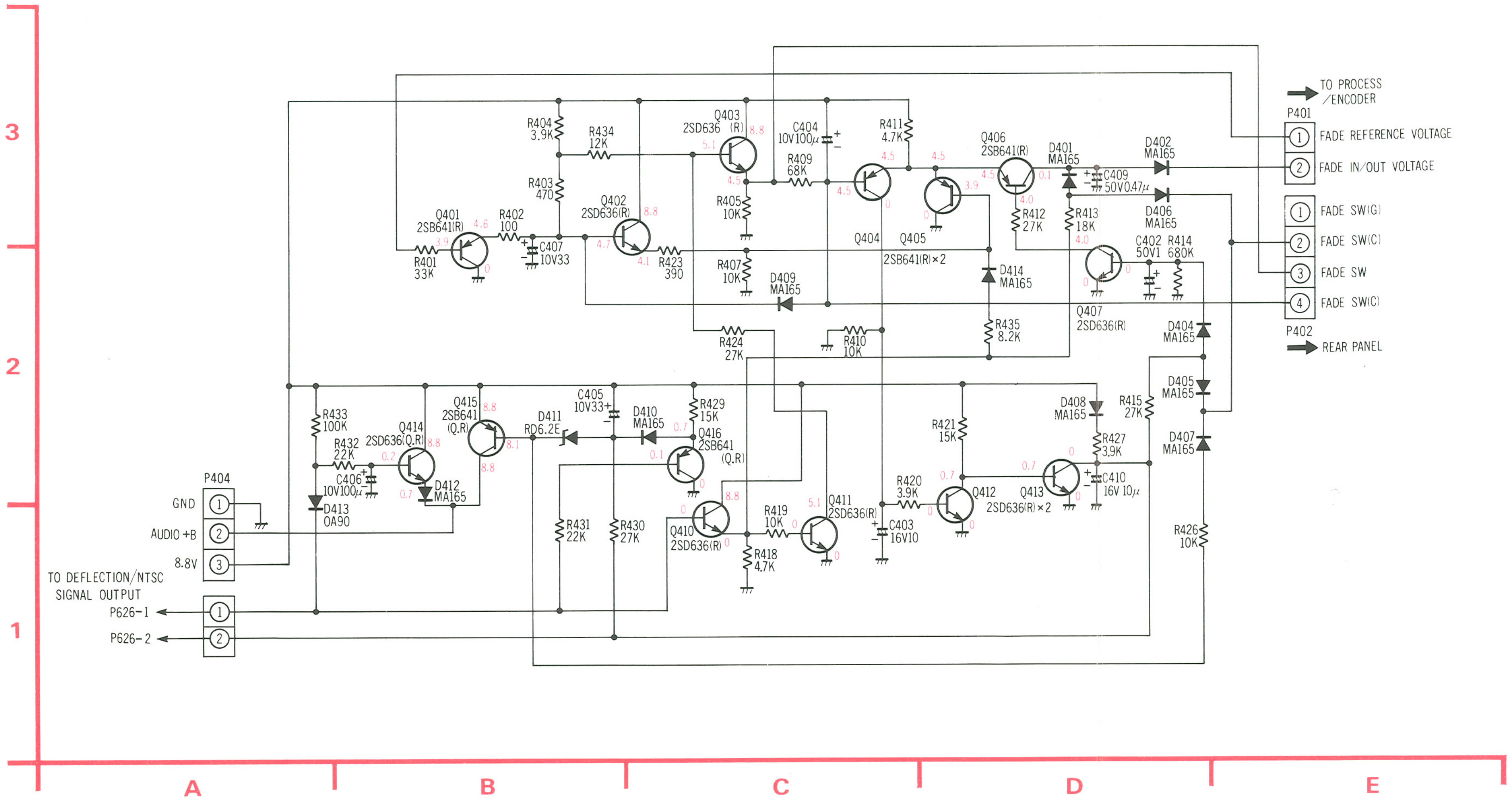

2SD636, 2SB641
B
C
E


1 2 3 4
AN6914
8 7 6 5

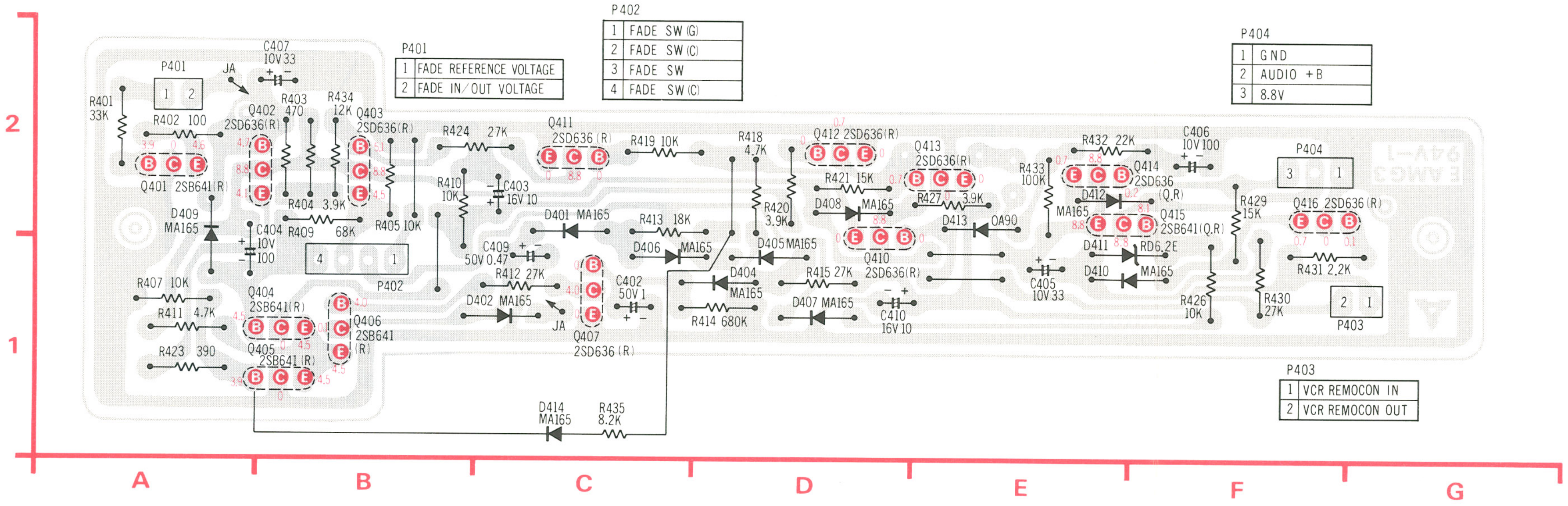

RD4.7E, MA165
K
A


AWC Circuit Board

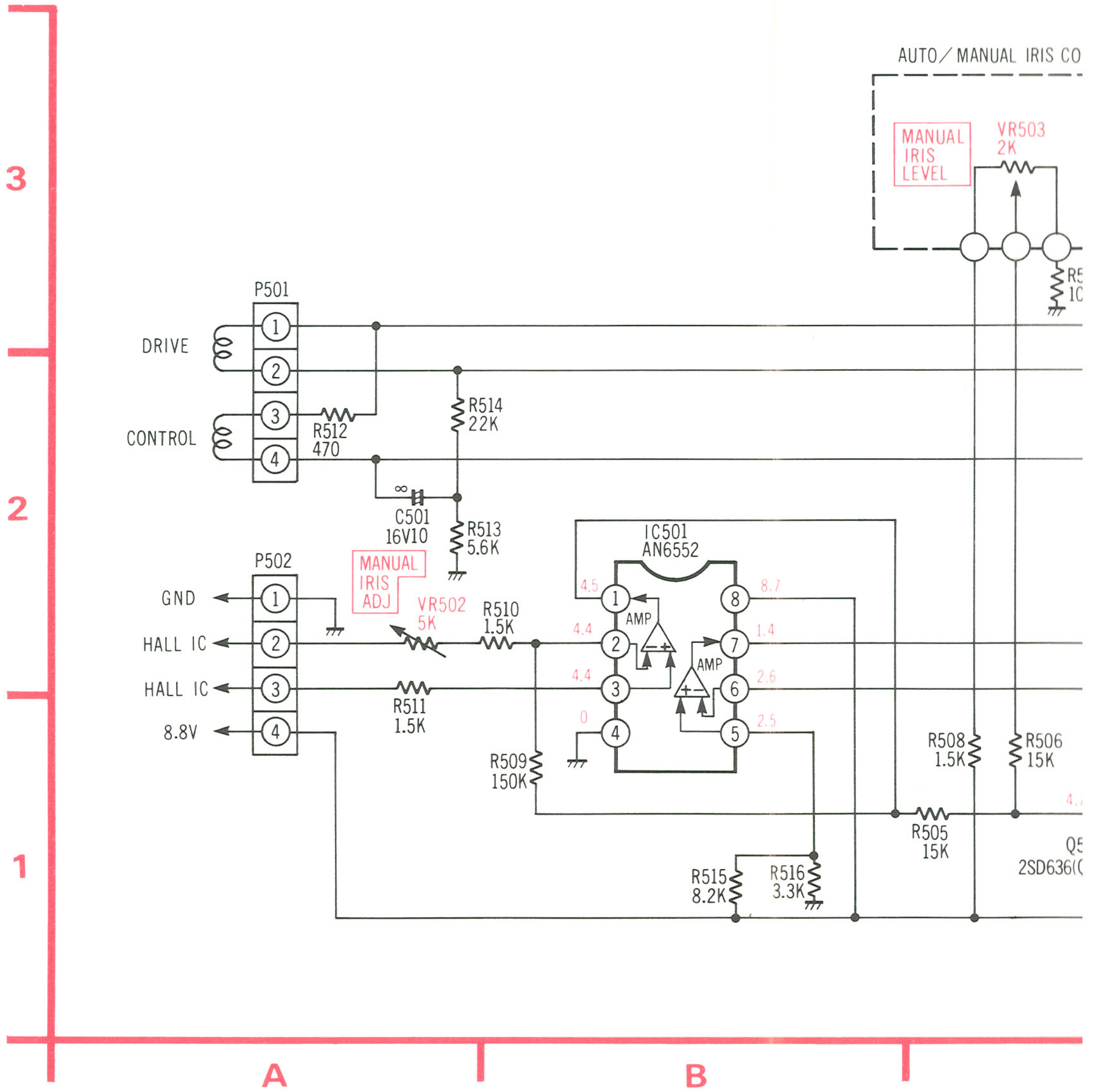
FADER SCHEMATIC DIAGRAM


TO PROCESS /ENCODER
P401
① FADE REFERENCE VOLTAGE
② FADE IN/OUT VOLTAGE
① FADE SW(G)
② FADE SW(C)
③ FADE SW
④ FADE SW(C)
P402
REAR PANEL
P404
GND
AUDIO +B
8.8V
TO DEFLECTION/NTSC SIGNAL OUTPUT
P626-1
P626-2
Q401 2SB641(R)
Q402 2SD636(R)
Q403 2SD636 (R)
Q404
Q405
2SB641(R)×2
Q406 2SB641(R)
Q407 2SD636(R)
Q410 2SD636(R)
Q411 2SD636(R)
Q412
Q413 2SD636(R)×2
Q414 2SD636(Q,R)
Q415 2SB641 (Q,R)
Q416 2SB641 (Q,R)
D401 MA165
D402 MA165
D404 MA165
D405 MA165
D406 MA165
D407 MA165
D408 MA165
D409 MA165
D410 MA165
D411 RD6.2E
D412 MA165
D413 OA90
D414 MA165
C402 50V1
C403 16V10
C404 10V100μ
C405 10V33
C406 10V100μ
C407 10V33
C409 50V0.47μ
C410 16V 10μ
R401 33K
R402 100
R403 470
R404 3.9K
R405 10K
R407 10K
R409 68K
R410 10K
R411 4.7K
R412 27K
R413 18K
R414 680K
R415 27K
R418 4.7K
R419 10K
R420 3.9K
R421 15K
R423 390
R424 27K
R426 10K
R427 3.9K
R429 15K
R430 27K
R431 22K
R432 22K
R433 100K
R434 12K
R435 8.2K
1
2
3
A
B
C
D
E

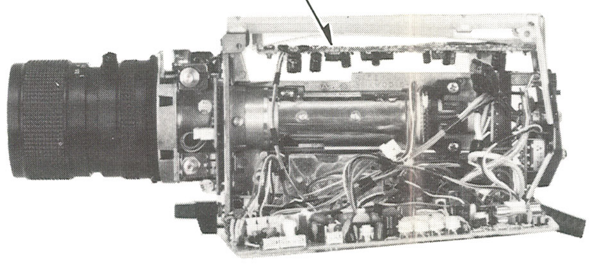
FADER CIRCUIT BOARD (VEPW0064)

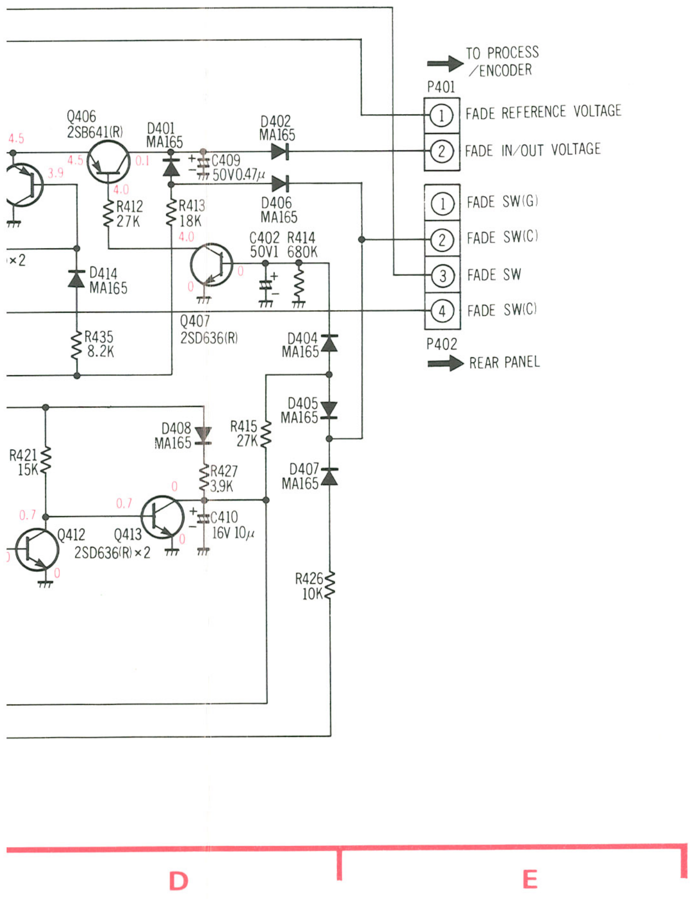

P401
1 FADE REFERENCE VOLTAGE
2 FADE IN/OUT VOLTAGE
P402
1 FADE SW (G)
2 FADE SW (C)
3 FADE SW
4 FADE SW (C)
P404
1 GND
2 AUDIO +B
3 8.8V
P403
1 VCR REMOCON IN
2 VCR REMOCON OUT
Q401 2SB641(R)
Q402 2SD636(R)
Q403 2SD636(R)
Q404 2SB641(R)
Q405 2SB641(R)
Q406 2SB641 (R)
Q407 2SD636 (R)
Q410 2SD636(R)
Q411 2SD636 (R)
Q412 2SD636(R)
Q413 2SD636(R)
Q414 2SD636 (Q,R)
Q415 2SB641(Q,R)
Q416 2SD636 (R)
JA
1
2
A
B
C
D
E
F
G

AUTOMATIC LENS IRIS CONTROL SCHEMATI

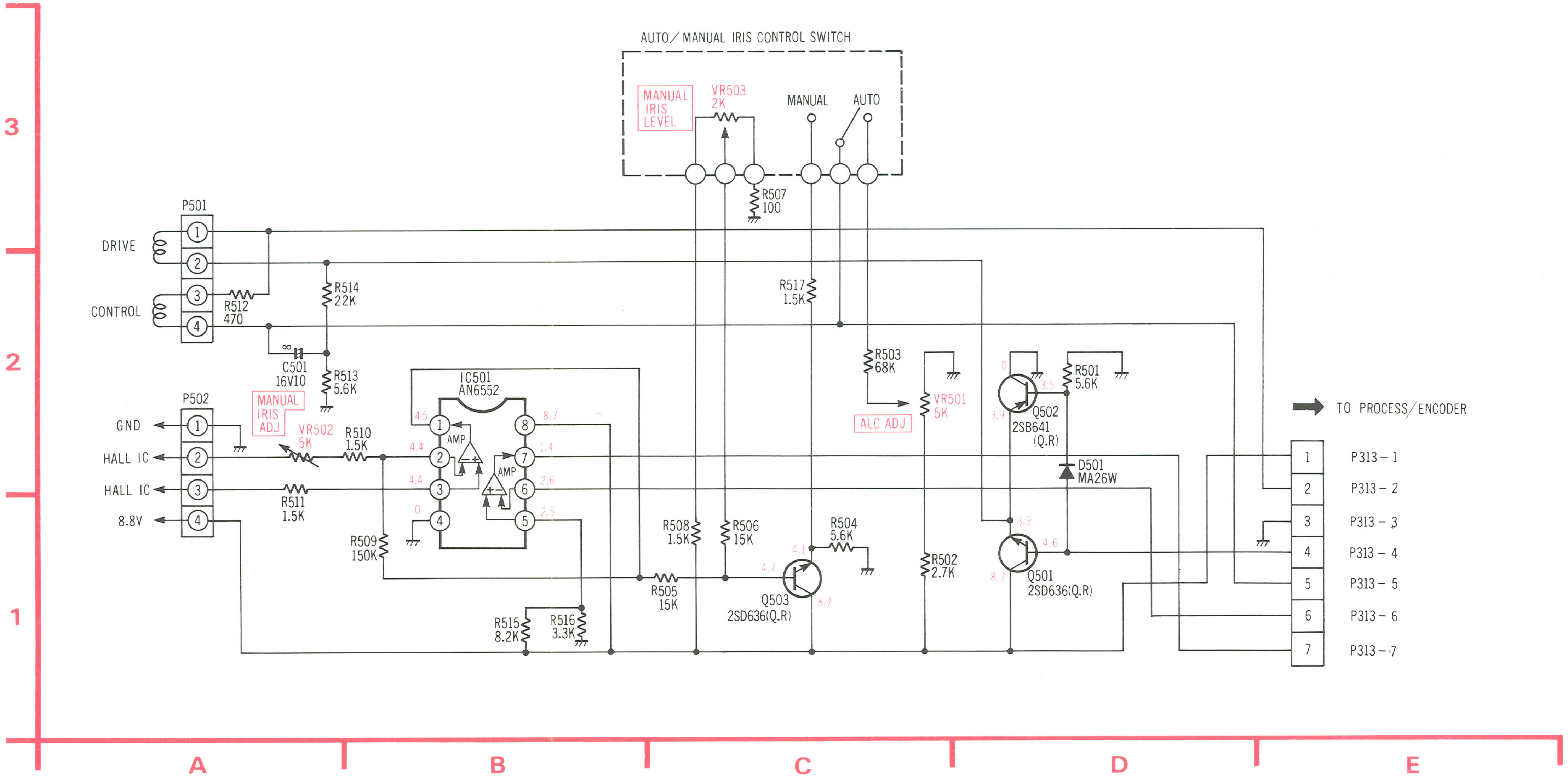

AUTO/MANUAL IRIS CO
MANUAL IRIS LEVEL
VR503 2K
P501
DRIVE
CONTROL
R512 470
R514 22K
C501 16V10
R513 5.6K
P502
GND
HALL IC
HALL IC
8.8V
MANUAL IRIS ADJ
VR502 5K
R510 1.5K
R511 1.5K
IC501 AN6552
AMP
AMP
R509 150K
R508 1.5K
R506 15K
R505 15K
R515 8.2K
R516 3.3K
2SD636(
1
2
3
A
B

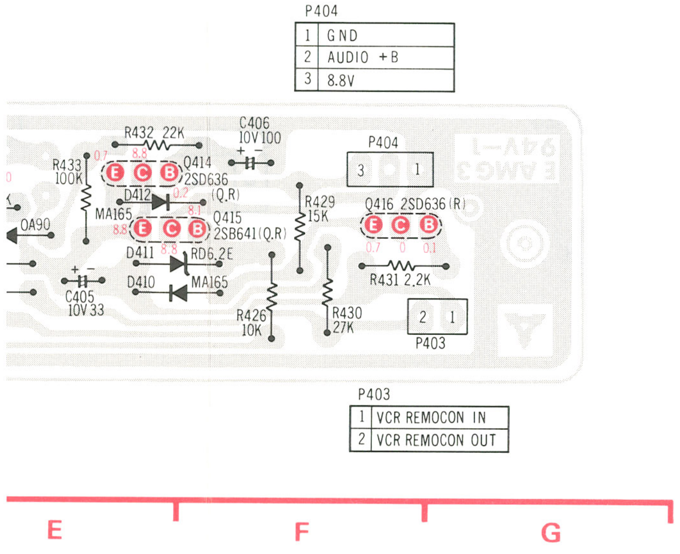
Fader Circuit Board



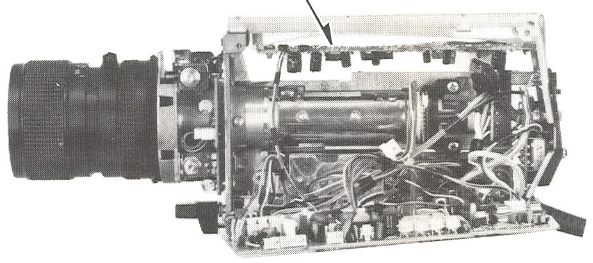

TO PROCESS /ENCODER
P401
① FADE REFERENCE VOLTAGE
② FADE IN/OUT VOLTAGE
① FADE SW(G)
② FADE SW(C)
③ FADE SW
④ FADE SW(C)
P402
REAR PANEL
Q406 2SB641(R)
D401 MA165
D402 MA165
C409 50V0.47μ
R412 27K
R413 18K
D406 MA165
C402 50V1
R414 680K
D414 MA165
R435 8.2K
Q407 2SD636(R)
D404 MA165
D405 MA165
D408 MA165
R415 27K
R427 3.9K
D407 MA165
R421 15K
C410 16V 10μ
Q412 Q413 2SD636(R)×2
R426 10K
D
E

AUTOMATIC LENS IRIS CONTROL SCHEMATIC DIAGRAM

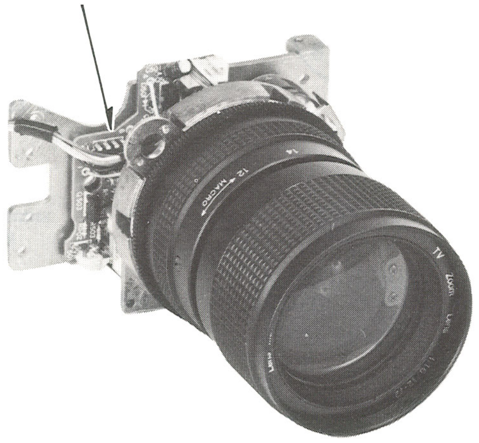

AUTO/MANUAL IRIS CONTROL SWITCH
MANUAL IRIS LEVEL
VR503 2K
MANUAL
AUTO
R507 100
P501
DRIVE
CONTROL
R512 470
R514 22K
R517 1.5K
C501 16V10
R513 5.6K
R503 68K
VR501 5K
ALC ADJ
R501 5.6K
Q502 2SB641 (Q.R)
TO PROCESS/ENCODER
P502
GND
HALL IC
HALL IC
8.8V
MANUAL IRIS ADJ
VR502 5K
R510 1.5K
R511 1.5K
IC501 AN6552
AMP
AMP
R509 150K
R508 1.5K
R506 15K
R504 5.6K
R505 15K
Q503 2SD636(Q.R)
R502 2.7K
D501 MA26W
Q501 2SD636(Q.R)
R515 8.2K
R516 3.3K
P313-1
P313-2
P313-3
P313-4
P313-5
P313-6
P313-7
3
2
1
A
B
C
D
E


P404
1 GND
2 AUDIO +B
3 8.8V
R432 22K
C406 10V 100
R433 100K
Q414 2SD636 (Q.R)
D412 MA165
Q415 2SB641(Q.R)
D411 RD6.2E
D410 MA165
C405 10V 33
R429 15K
Q416 2SD636(R)
R431 2.2K
R426 10K
R430 27K
P403
1 VCR REMOCON IN
2 VCR REMOCON OUT
E
F
G

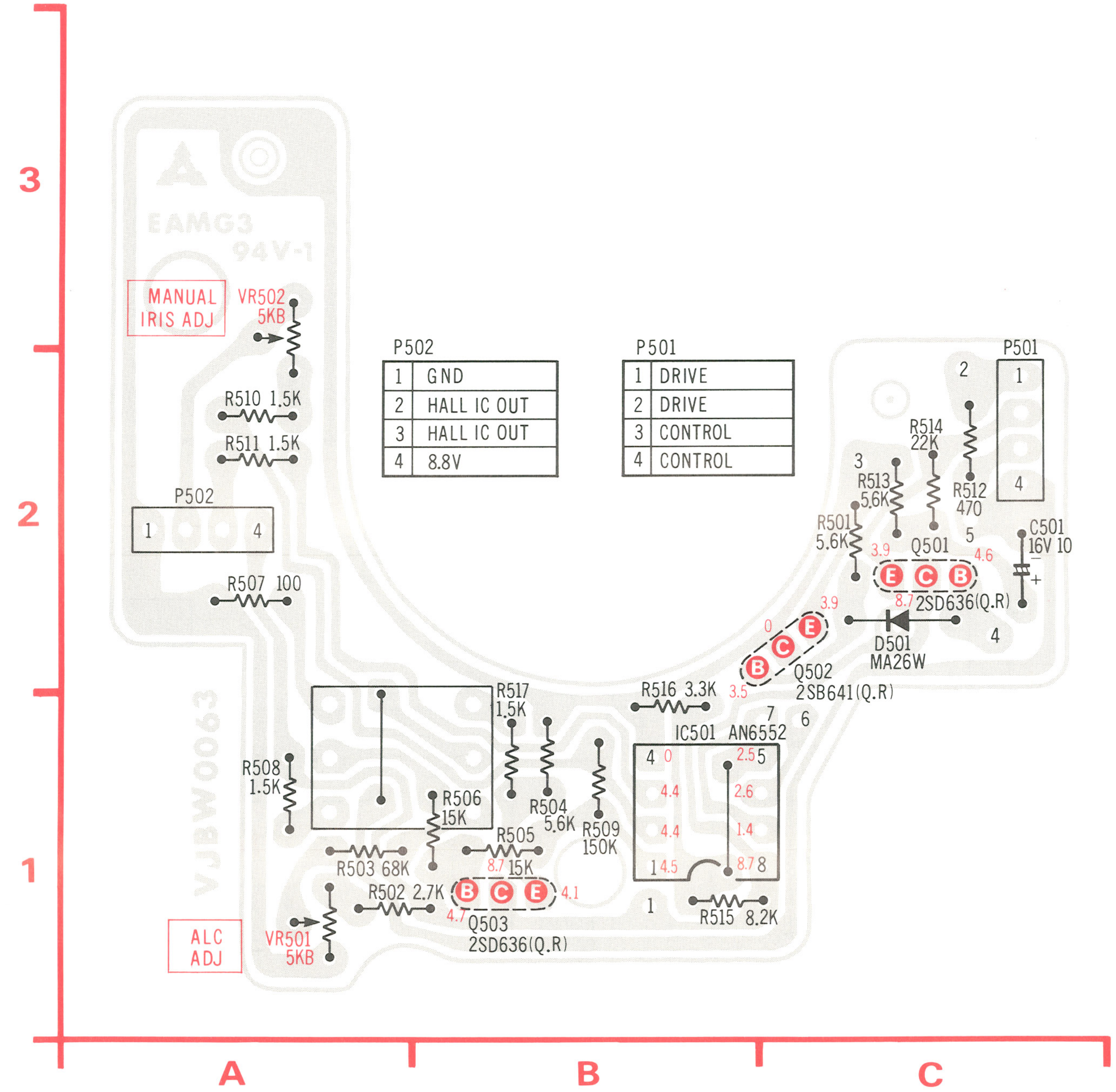
Fader Circuit Board

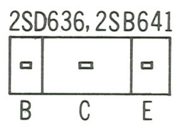


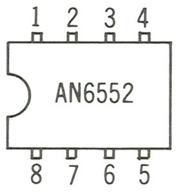
Automatic Lens Iris Control Circuit Board

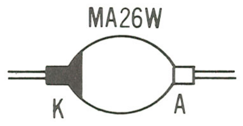


AUTOMATIC LENS IRIS CONTROL CIRCUIT BOARD
(VEPW0063)

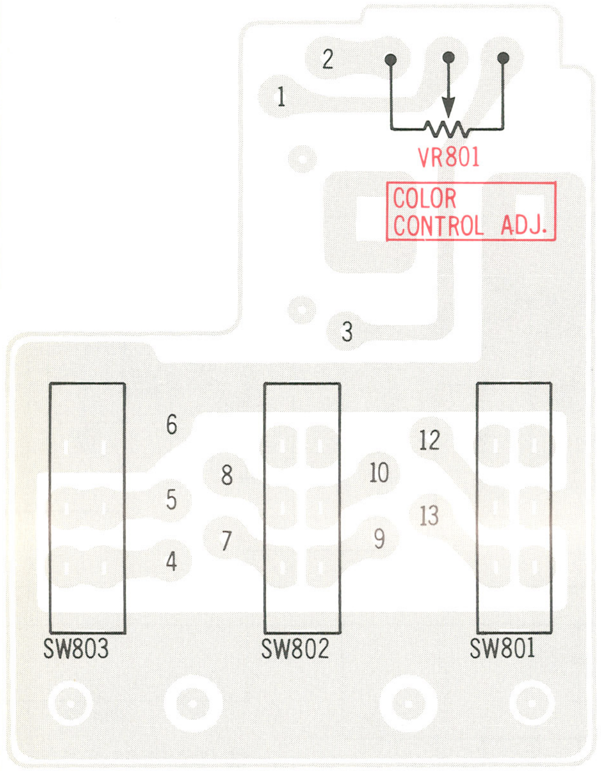

3
2
1
A
B
C
EAMG3
94V-1
VJBW0063
MANUAL IRIS ADJ
VR502 5KB
R510 1.5K
R511 1.5K
P502
1
4
R507 100
P502
1 GND
2 HALL IC OUT
3 HALL IC OUT
4 8.8V
P501
1 DRIVE
2 DRIVE
3 CONTROL
4 CONTROL
P501
1
2
4
R514 22K
3
R513 5.6K
R512 470
R501 5.6K
3.9
Q501
5
4.6
C501 16V 10
E C B
8.7
2SD636(Q.R)
3.9
0
E
C
B
D501 MA26W
4
Q502 2SB641(Q.R)
3.5
R516 3.3K
R517 1.5K
7
6
IC501 AN6552
4 0
2.5 5
4.4
2.6
4.4
1.4
1 4.5
8.7 8
1
R515 8.2K
R508 1.5K
R506 15K
R504 5.6K
R509 150K
R505
8.7 15K
R503 68K
R502 2.7K
B C E
4.7
4.1
Q503
2SD636(Q.R)
ALC ADJ
VR501 5KB


2SD636, 2SB641
B
C
E

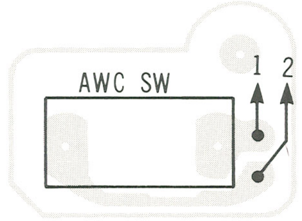

1 2 3 4
AN6552
8 7 6 5



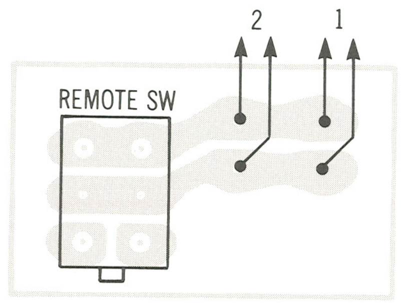
REAR SIDE CIRCUIT BOARD
(VEPW0065)


2
1
VR801
COLOR CONTROL ADJ.
3
6
5
4
8
7
10
9
12
13
SW803
SW802
SW801

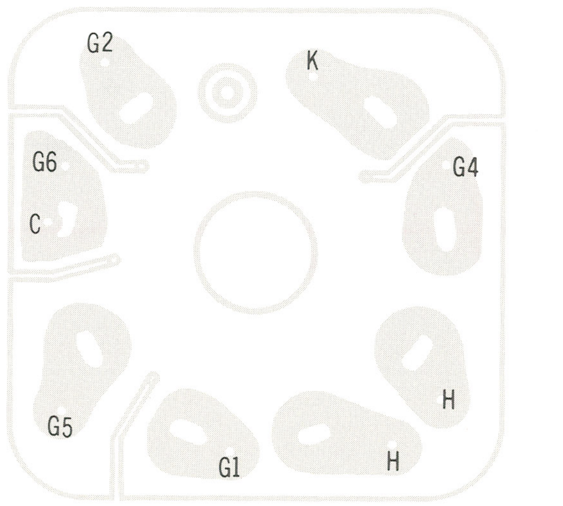
AWC SW CIRCUIT BOARD
(VEPW0066)



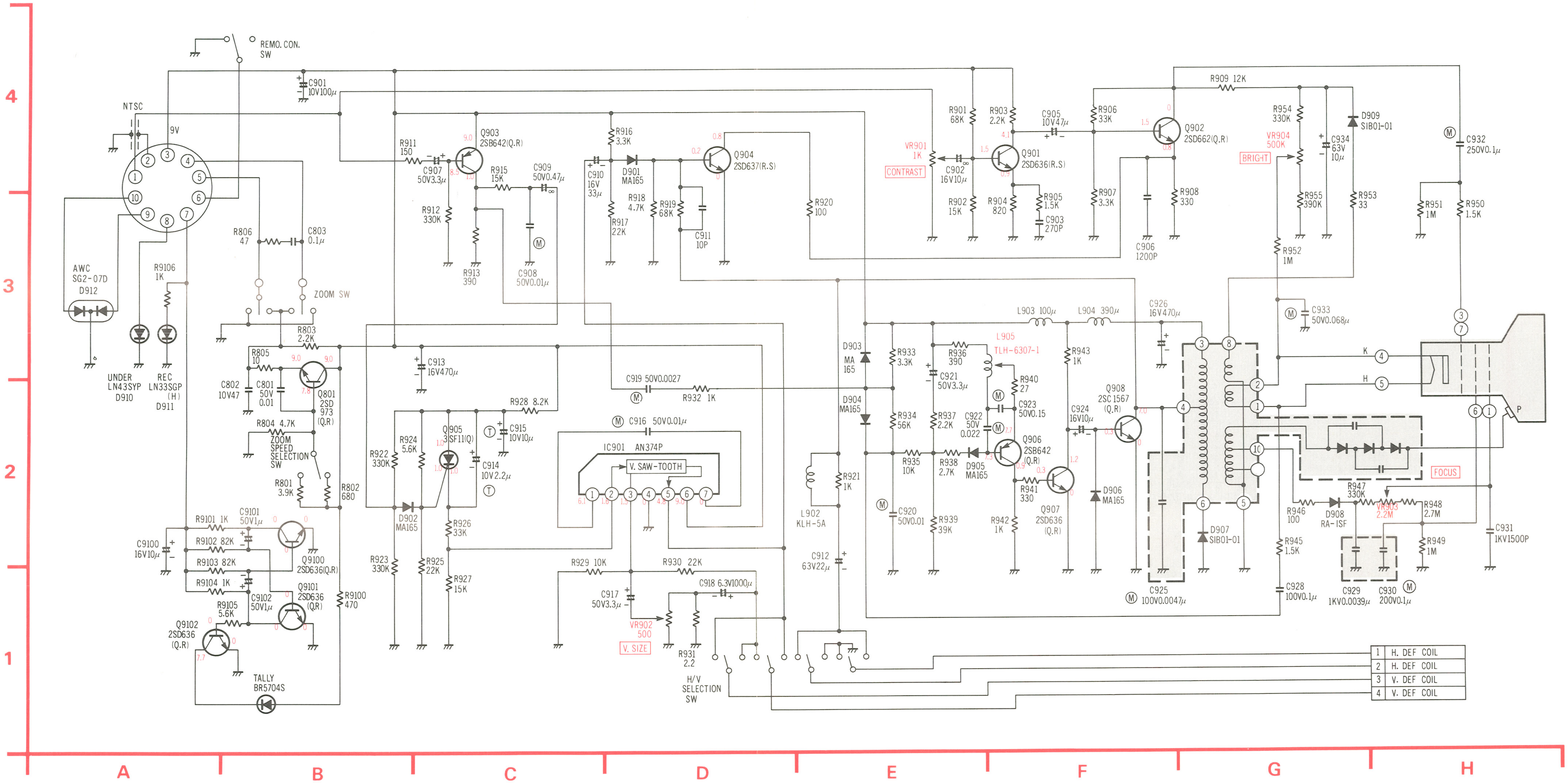
REMO. CON. SW CIRCUIT BOARD
(VEPW0067)


REMOTE SW
2
1

VIDICON SOCKET CIRCUIT BOARD
(VEPW0082A)


G2
K
G6
C
G4
G5
G1
H
H

ELECTRONIC VIEWFINDER SCHEMATIC DIAGRAM

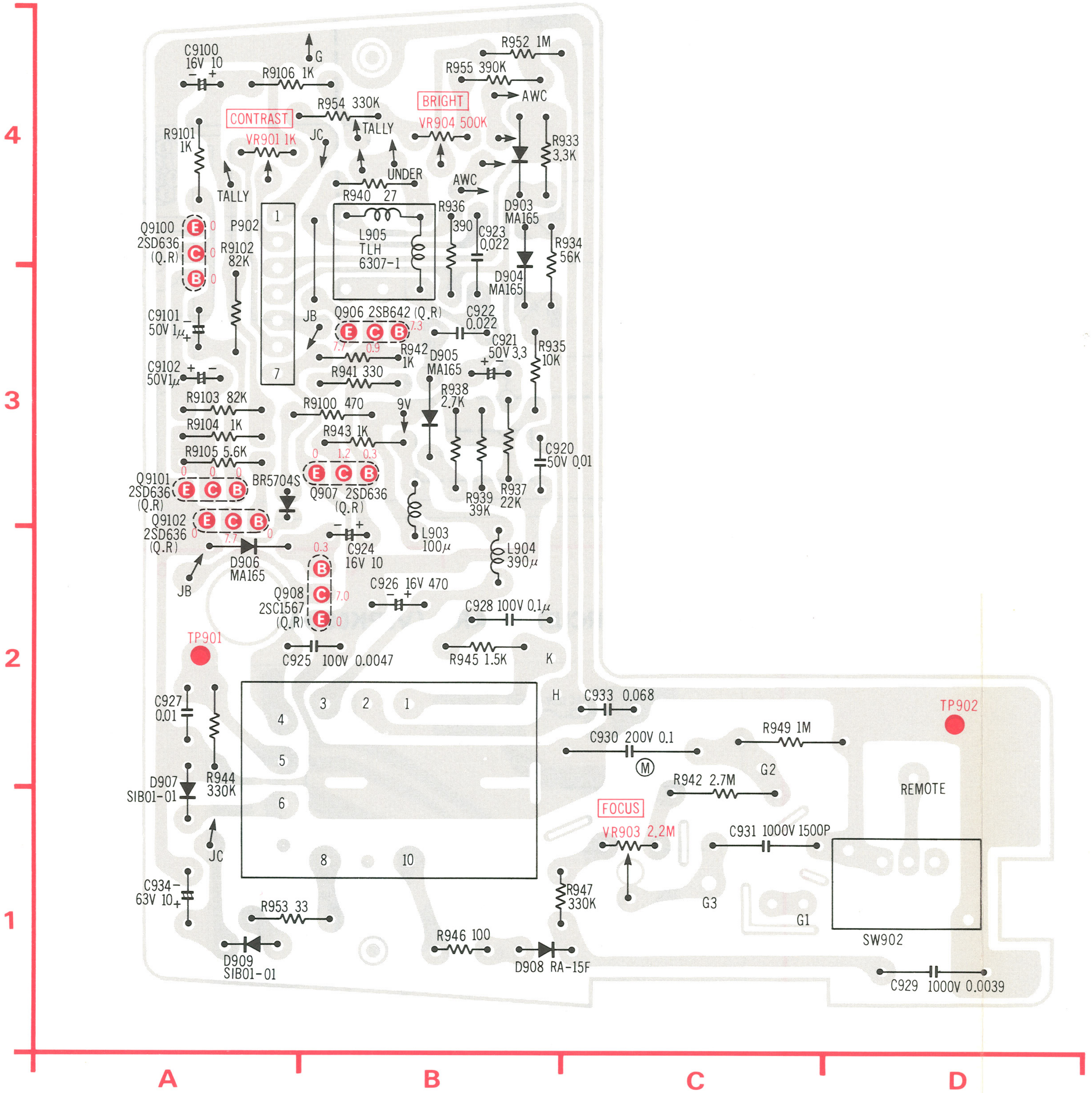


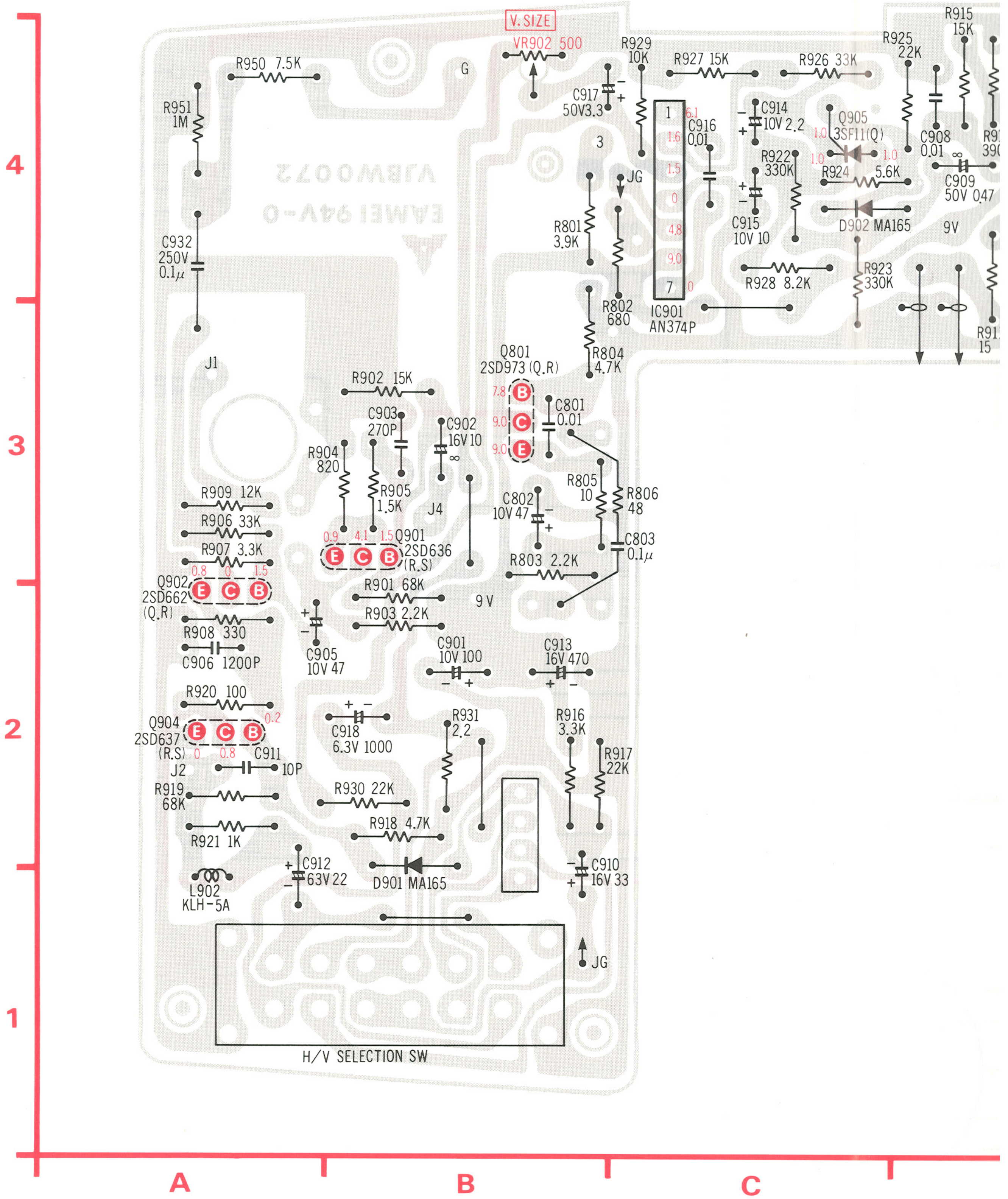
4
3
2
1
A
B
C
D
E
F
G
H
REMO. CON. SW
NTSC
9V
C901 10V100μ
AWC SG2-07D D912
UNDER LN43SYP D910
REC LN33SGP (H) D911
R9106 1K
R806 47
C803 0.1μ
ZOOM SW
R803 2.2K
R805 10
Q801 2SD973 (Q.R)
C802 10V47
C801 50V 0.01
R804 4.7K
ZOOM SPEED SELECTION SW
R801 3.9K
R802 680
R9101 1K
C9101 50V1μ
R9102 82K
R9103 82K
Q9100 2SD636(Q.R)
R9104 1K
C9100 16V10μ
C9102 50V1μ
Q9101 2SD636 (Q.R)
R9105 5.6K
Q9102 2SD636 (Q.R)
R9100 470
TALLY BR5704S
R911 150
C907 50V3.3μ
Q903 2SB642(Q.R)
R915 15K
C909 50V0.47μ
R912 330K
R913 390
C908 50V0.01μ
C913 16V470μ
R928 8.2K
Q905 3SF11(Q)
C915 10V10μ
C914 10V2.2μ
R924 5.6K
R922 330K
D902 MA165
R926 33K
R923 330K
R925 22K
R927 15K
R916 3.3K
C910 16V 33μ
D901 MA165
R918 4.7K
R917 22K
R919 68K
C911 10P
Q904 2SD637(R.S)
R920 100
C919 50V0.0027
R932 1K
C916 50V0.01μ
IC901 AN374P
V. SAW-TOOTH
R929 10K
R930 22K
C917 50V3.3μ
C918 6.3V1000μ
VR902 500
V. SIZE
R931 2.2
H/V SELECTION SW
R901 68K
R903 2.2K
C905 10V47μ
VR901 1K
CONTRAST
C902 16V10μ
Q901 2SD636(R.S)
R902 15K
R904 820
R905 1.5K
C903 270P
R906 33K
R907 3.3K
Q902 2SD662(Q.R)
R908 330
C906 1200P
R909 12K
R954 330K
VR904 500K
BRIGHT
C934 63V 10μ
D909 SIB01-01
R955 390K
R953 33
R952 1M
C932 250V0.1μ
R951 1M
R950 1.5K
D903 MA165
D904 MA165
L902 KLH-5A
R921 1K
C912 63V22μ
L903 100μ
L904 390μ
C926 16V470μ
L905 TLH-6307-1
R933 3.3K
R936 390
C921 50V3.3μ
R940 27
C923 50V0.15
R943 1K
R934 56K
R937 2.2K
C922 50V 0.022
Q906 2SB642 (Q.R)
C924 16V10μ
Q908 2SC1567 (Q.R)
R935 10K
R938 2.7K
D905 MA165
R941 330
Q907 2SD636 (Q.R)
D906 MA165
C920 50V0.01
R939 39K
R942 1K
C933 50V0.068μ
K
H
P
D907 SIB01-01
C925 100V0.0047μ
R946 100
D908 RA-1SF
R947 330K
VR903 2.2M
R948 2.7M
FOCUS
R945 1.5K
R949 1M
C931 1KV1500P
C928 100V0.1μ
C929 1KV0.0039μ
C930 200V0.1μ
1 H. DEF COIL
2 H. DEF COIL
3 V. DEF COIL
4 V. DEF COIL

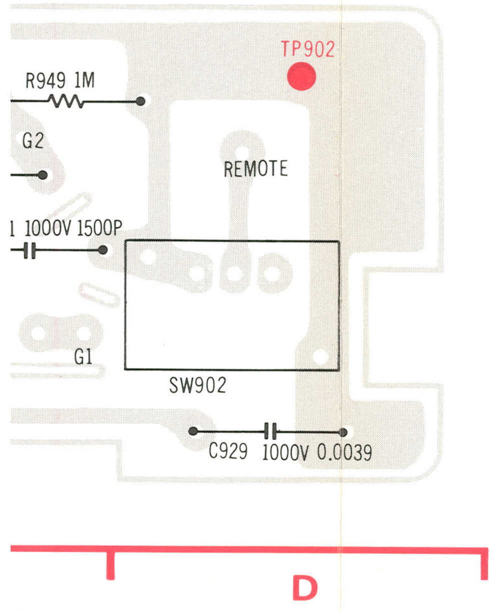
PRODUCT SAFETY NOTE

The shaded area on this schematic diagram incorporates special features important for protection from X-Radiation, fire and electrical shock hazards when servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

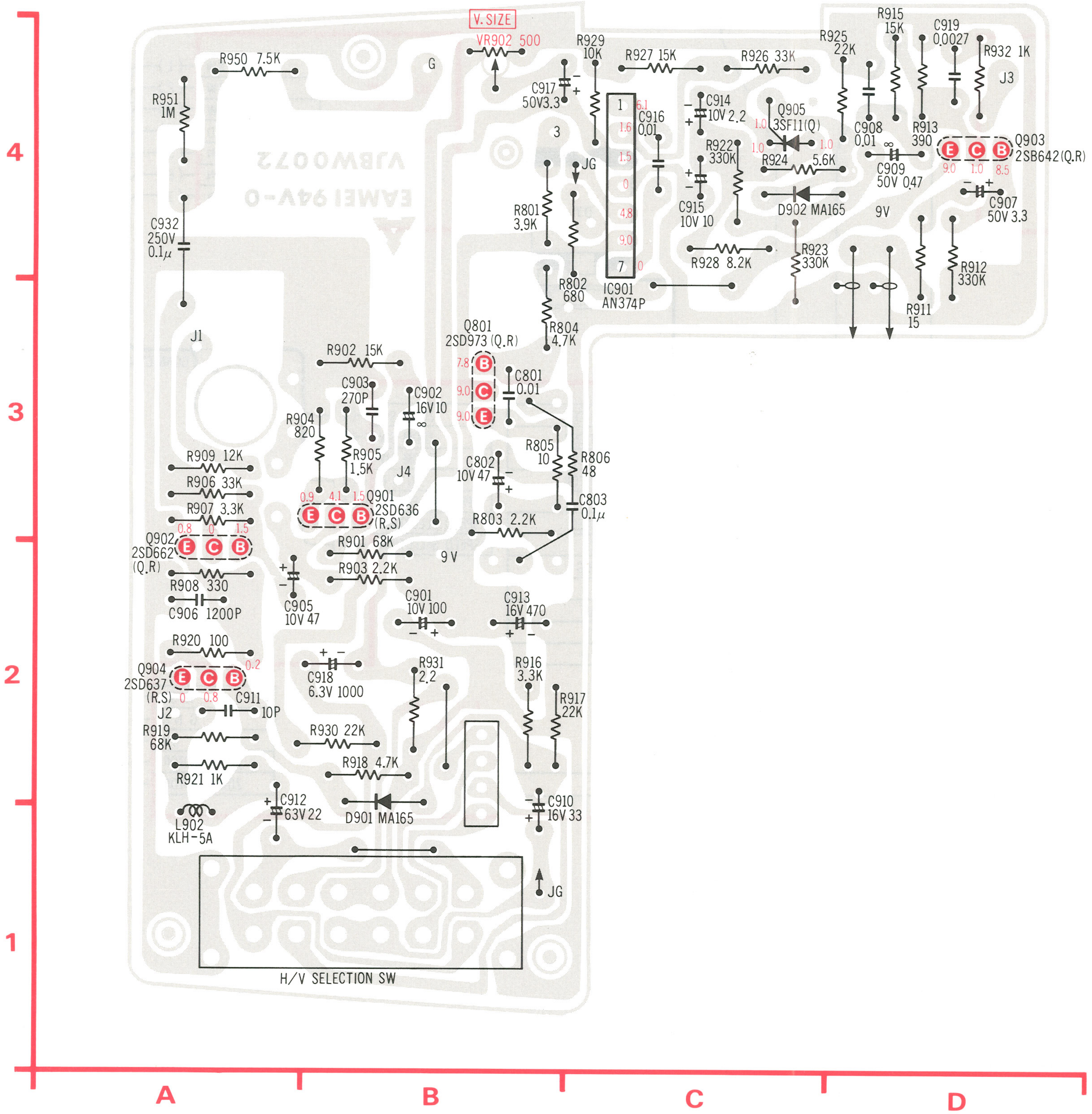
ELECTRONIC VIEWFINDER CIRCUIT BOARD


4
3
2
1
A
B
C
D
C9100 16V 10
R9106 1K
G
R952 1M
R955 390K
AWC
BRIGHT
VR904 500K
R954 330K
TALLY
CONTRAST
VR901 1K
JC
R9101 1K
R933 3.3K
UNDER
R940 27
AWC
TALLY
R936 390
D903 MA165
C923 0.022
L905 TLH 6307-1
Q9100 2SD636 (Q.R)
P902
R9102 82K
R934 56K
D904 MA165
C9101 50V 1μ
JB
Q906 2SB642 (Q.R)
C922 0.022
C921 50V 3.3
R942 1K
D905 MA165
R935 10K
C9102 50V 1μ
R941 330
R938 2.7K
R9103 82K
R9100 470
9V
R9104 1K
R943 1K
C920 50V 0.01
R9105 5.6K
Q9101 2SD636 (Q.R)
BR5704S
Q907 2SD636 (Q.R)
R939 39K
R937 22K
Q9102 2SD636 (Q.R)
L903 100μ
C924 16V 10
L904 390μ
D906 MA165
JB
Q908 2SC1567 (Q.R)
C926 16V 470
C928 100V 0.1μ
TP901
C925 100V 0.0047
R945 1.5K
K
H
C933 0.068
TP902
C927 0.01
C930 200V 0.1
R949 1M
M
R942 2.7M
G2
D907 SIB01-01
R944 330K
REMOTE
FOCUS
VR903 2.2M
C931 1000V 1500P
JC
C934 63V 10
R947 330K
G3
G1
R953 33
SW902
R946 100
D909 SIB01-01
D908 RA-15F
C929 1000V 0.0039


4
3
2
1
A
B
C
V. SIZE
VR902 500
R950 7.5K
G
R929 10K
R927 15K
R926 33K
R925 22K
R915 15K
R951 1M
C917 50V3.3
C914 10V 2.2
Q905 3SF11(Q)
C916 0.01
R922 330K
R924 5.6K
C908 0.01
C909 50V 047
JG
R801 3.9K
C915 10V 10
D902 MA165
9V
C932 250V 0.1μ
R802 680
IC901 AN374P
R928 8.2K
R923 330K
J1
Q801 2SD973 (Q.R)
R804 4.7K
R902 15K
C801 0.01
C903 270P
C902 16V 10
R904 820
R905 1.5K
R805 10
R806 48
R909 12K
J4
C802 10V 47
R906 33K
C803 0.1μ
R907 3.3K
Q901 2SD636 (R.S)
R803 2.2K
Q902 2SD662 (Q.R)
R901 68K
9 V
R903 2.2K
R908 330
C905 10V 47
C901 10V 100
C913 16V 470
C906 1200P
R920 100
C918 6.3V 1000
R931 2.2
R916 3.3K
Q904 2SD637 (R.S)
C911 10P
R917 22K
J2
R919 68K
R930 22K
R918 4.7K
R921 1K
C912 63V 22
D901 MA165
C910 16V 33
L902 KLH-5A
JG
H/V SELECTION SW

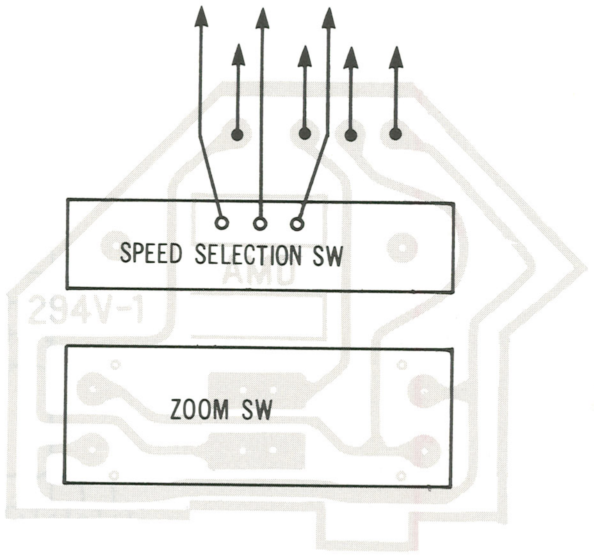


TP902
R949 1M
G2
REMOTE
1000V 1500P
G1
SW902
C929 1000V 0.0039
D



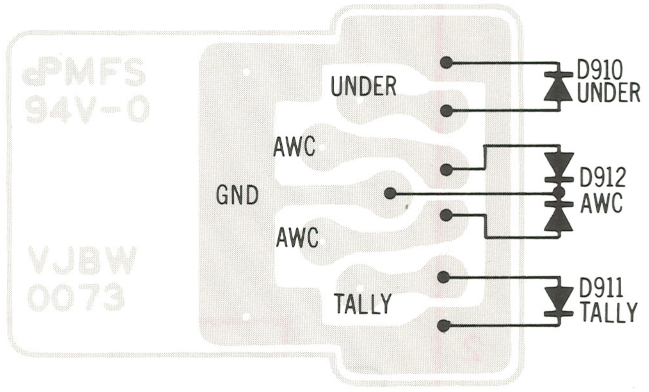
V.SIZE
VR902 500
R950 7.5K
G
R929 10K
R927 15K
R926 33K
R925 22K
R915 15K
C919 0.0027
R932 1K
J3
R951 1M
C917 50V3.3
3
C916 0.01
C914 10V 2.2
Q905 3SF11(Q)
C908 0.01
R913 390
Q903 2SB642(Q.R)
R922 330K
R924 5.6K
C909 50V 047
JG
R801 3.9K
C915 10V 10
D902 MA165
9V
C907 50V 3.3
C932 250V 0.1μ
IC901 AN374P
R928 8.2K
R923 330K
R912 330K
R802 680
R911 15
J1
Q801 2SD973 (Q.R)
R804 4.7K
R902 15K
C903 270P
C902 16V 10
C801 0.01
R904 820
R905 1.5K
J4
R805 10
R806 48
R909 12K
R906 33K
C802 10V 47
R907 3.3K
Q901 2SD636 (R.S)
C803 0.1μ
R803 2.2K
Q902 2SD662 (Q.R)
R901 68K
R903 2.2K
9 V
R908 330
C906 1200P
C905 10V 47
C901 10V 100
C913 16V 470
R920 100
C918 6.3V 1000
R931 2.2
R916 3.3K
R917 22K
Q904 2SD637 (R.S)
J2
C911 10P
R919 68K
R930 22K
R918 4.7K
R921 1K
C912 63V 22
D901 MA165
C910 16V 33
L902 KLH-5A
JG
H/V SELECTION SW
4
3
2
1
A
B
C
D

ZOOM SW CIRCUIT BOARD
(VEPW0075)

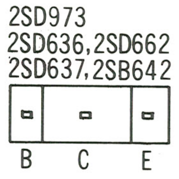


SPEED SELECTION SW
ZOOM SW

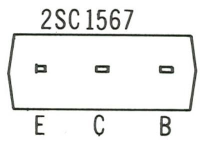
LED SW CIRCUIT BOARD
(VEPW0073)



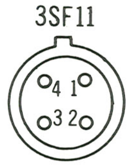
UNDER
D910 UNDER
AWC
GND
D912 AWC
AWC
TALLY
D911 TALLY

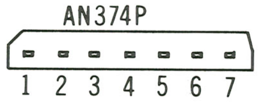


2SD973
2SD636, 2SD662
2SD637, 2SB642
B
C
E

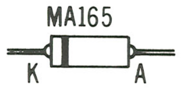


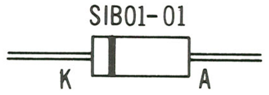
2SC1567
E
C
B





AN374P
1
2
3
4
5
6
7

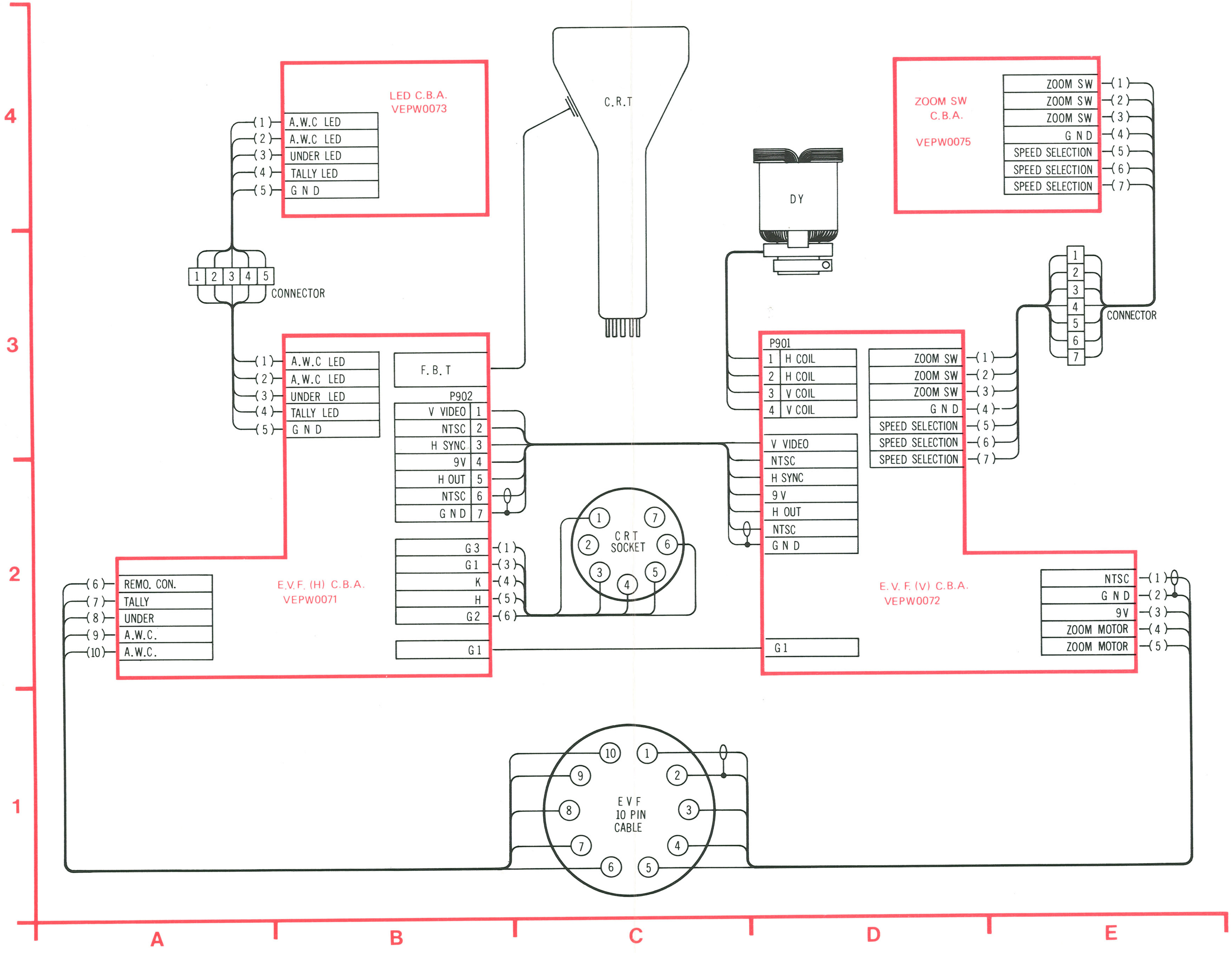




ELECTRONIC VIEWFINDER INTERCONNECTION SCHEMATIC DIAGRAM

PRODUCT SAFETY NOTE

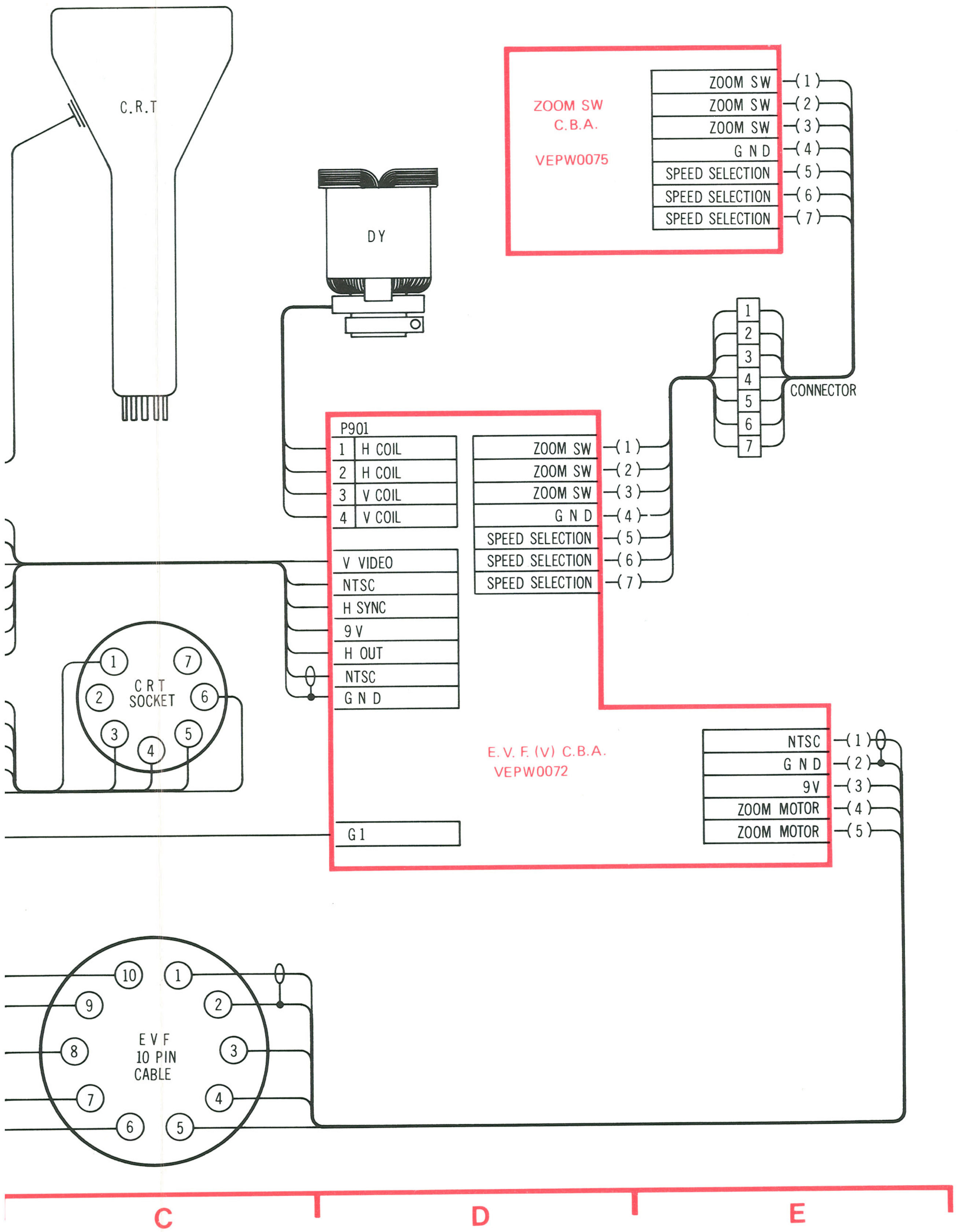
The shaded area on this schematic diagram incorporates special features important for protection from X-Radiation, fire and electrical shock hazards when servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.


4
3
2
1
A
B
C
D
E
LED C.B.A.
VEPW0073
A.W.C LED
A.W.C LED
UNDER LED
TALLY LED
G N D
1 2 3 4 5
CONNECTOR
C.R.T
DY
ZOOM SW
C.B.A.
VEPW0075
ZOOM SW
ZOOM SW
ZOOM SW
G N D
SPEED SELECTION
SPEED SELECTION
SPEED SELECTION
1 2 3 4 5 6 7
CONNECTOR
F. B. T
P902
V VIDEO
NTSC
H SYNC
9V
H OUT
NTSC
G N D
G 3
G 1
K
H
G 2
G 1
REMO. CON.
TALLY
UNDER
A.W.C.
A.W.C.
E.V.F. (H) C.B.A.
VEPW0071
C R T
SOCKET
P901
H COIL
H COIL
V COIL
V COIL
V VIDEO
NTSC
H SYNC
9 V
H OUT
NTSC
G N D
G 1
E. V. F. (V) C.B.A.
VEPW0072
NTSC
G N D
9 V
ZOOM MOTOR
ZOOM MOTOR
E V F
10 PIN
CABLE

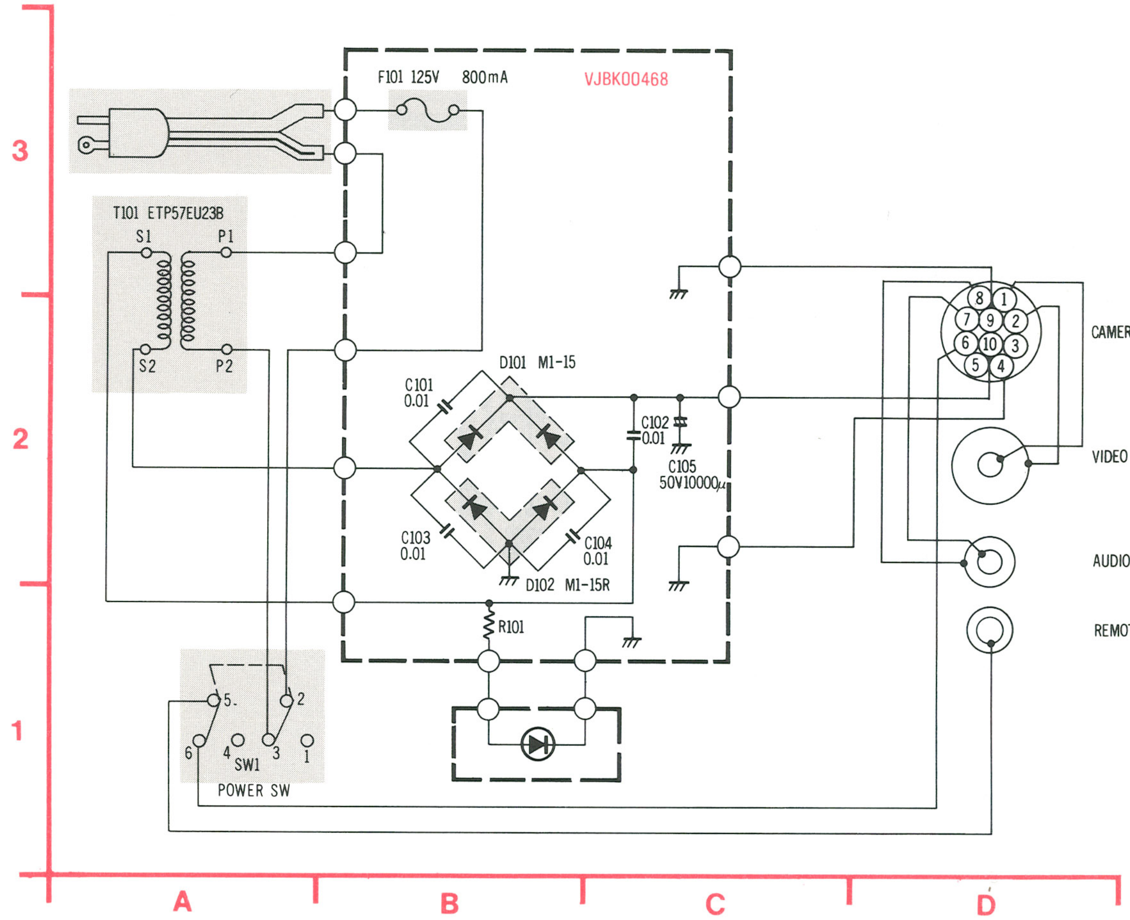
ECTION SCHEMATIC DIAGRAM

PRODUCT SAFETY NOTE

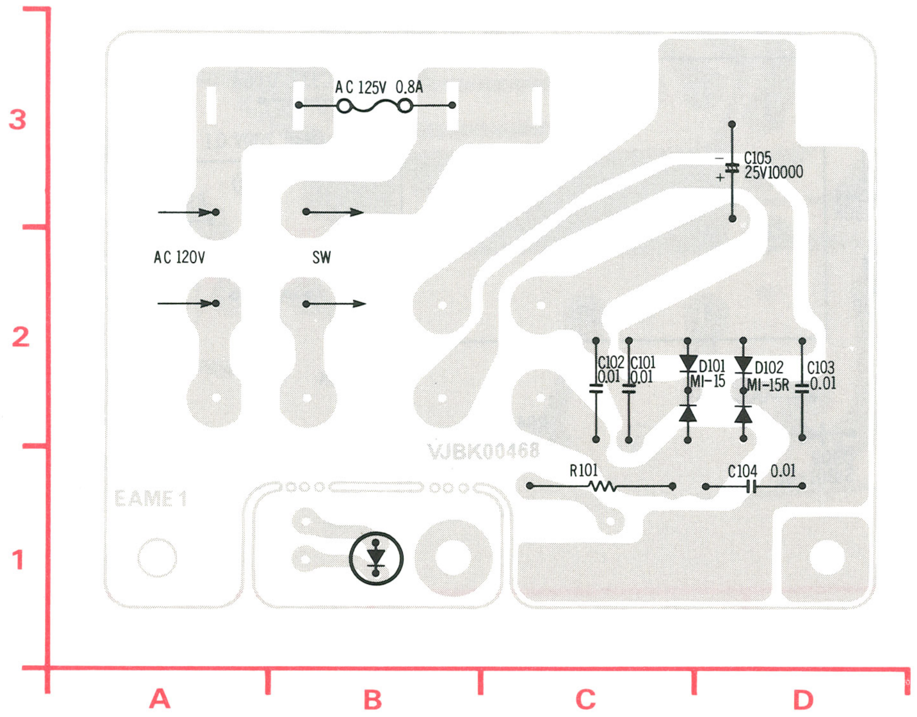
The shaded area on this schematic diagram incorporates special features important for protection from X-Radiation, fire and electrical shock hazards when servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.


C.R.T
DY
ZOOM SW C.B.A.
VEPW0075
ZOOM SW
ZOOM SW
ZOOM SW
G N D
SPEED SELECTION
SPEED SELECTION
SPEED SELECTION
1 2 3 4 5 6 7
CONNECTOR
P901
1 H COIL
2 H COIL
3 V COIL
4 V COIL
V VIDEO
NTSC
H SYNC
9 V
H OUT
NTSC
G N D
C R T SOCKET
1 2 3 4 5 6 7
E. V. F. (V) C.B.A.
VEPW0072
NTSC
G N D
9 V
ZOOM MOTOR
ZOOM MOTOR
G 1
E V F 10 PIN CABLE
1 2 3 4 5 6 7 8 9 10
C
D
E

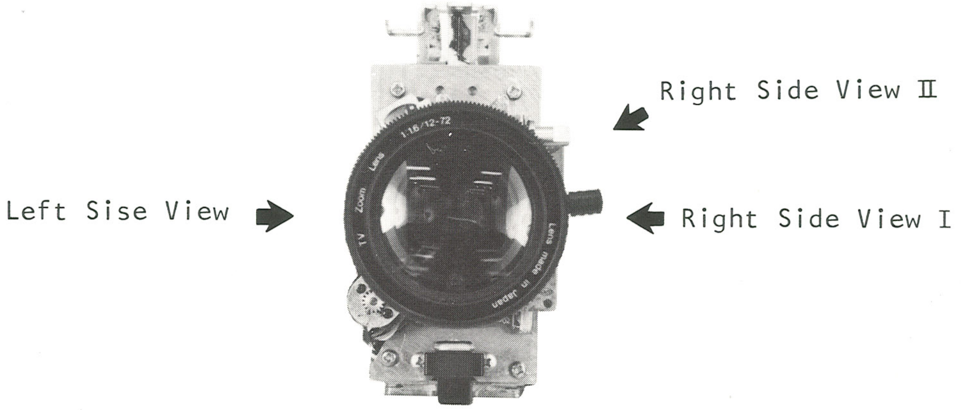
POWER SUPPLY SCHEMATIC DIAGRAM
(OPTIONAL ACCESSORY)


F101 125V 800mA
VJBK00468
T101 ETP57EU23B
S1
P1
S2
P2
D101 M1-15
C101 0.01
C102 0.01
C105 50V10000μ
C103 0.01
C104 0.01
D102 M1-15R
R101
SW1
POWER SW
CAMERA IN
VIDEO OUT
AUDIO OUT
REMOTE CON.
1 2 3
A B C D

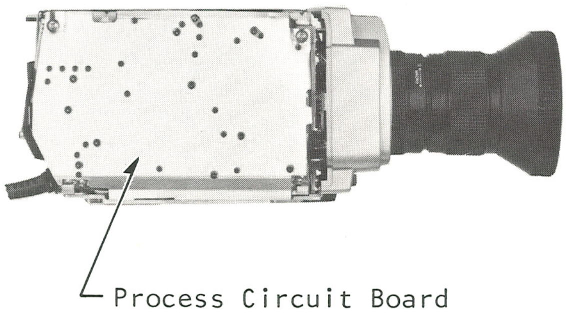
POWER SUPPLY CIRCUIT BOARD (VEPK00468)


AC 125V 0.8A
C105 25V10000
AC 120V
SW
C102 0.01
C101 0.01
D101 MI-15
D102 MI-15R
C103 0.01
VJBK00468
R101
C104 0.01
EAME1
1 2 3
A B C D

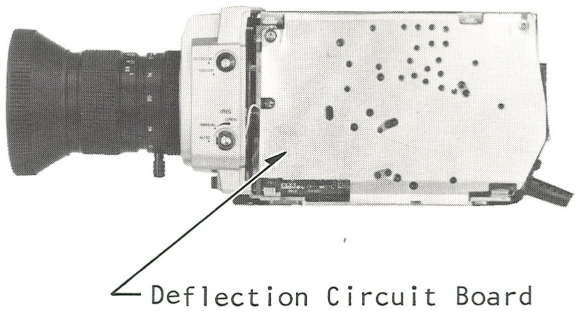
CIRCUIT BOARD LAYOUT

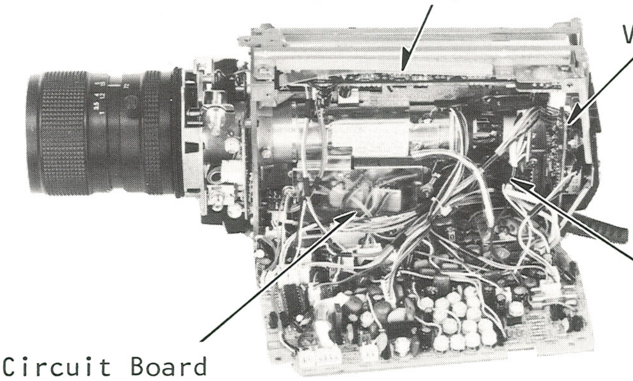

Right Side View Ⅱ
Left Sise View
Right Side View I
1:1.6/12-72
Zoom Lens
TV
Lens made in Japan

Left Side View

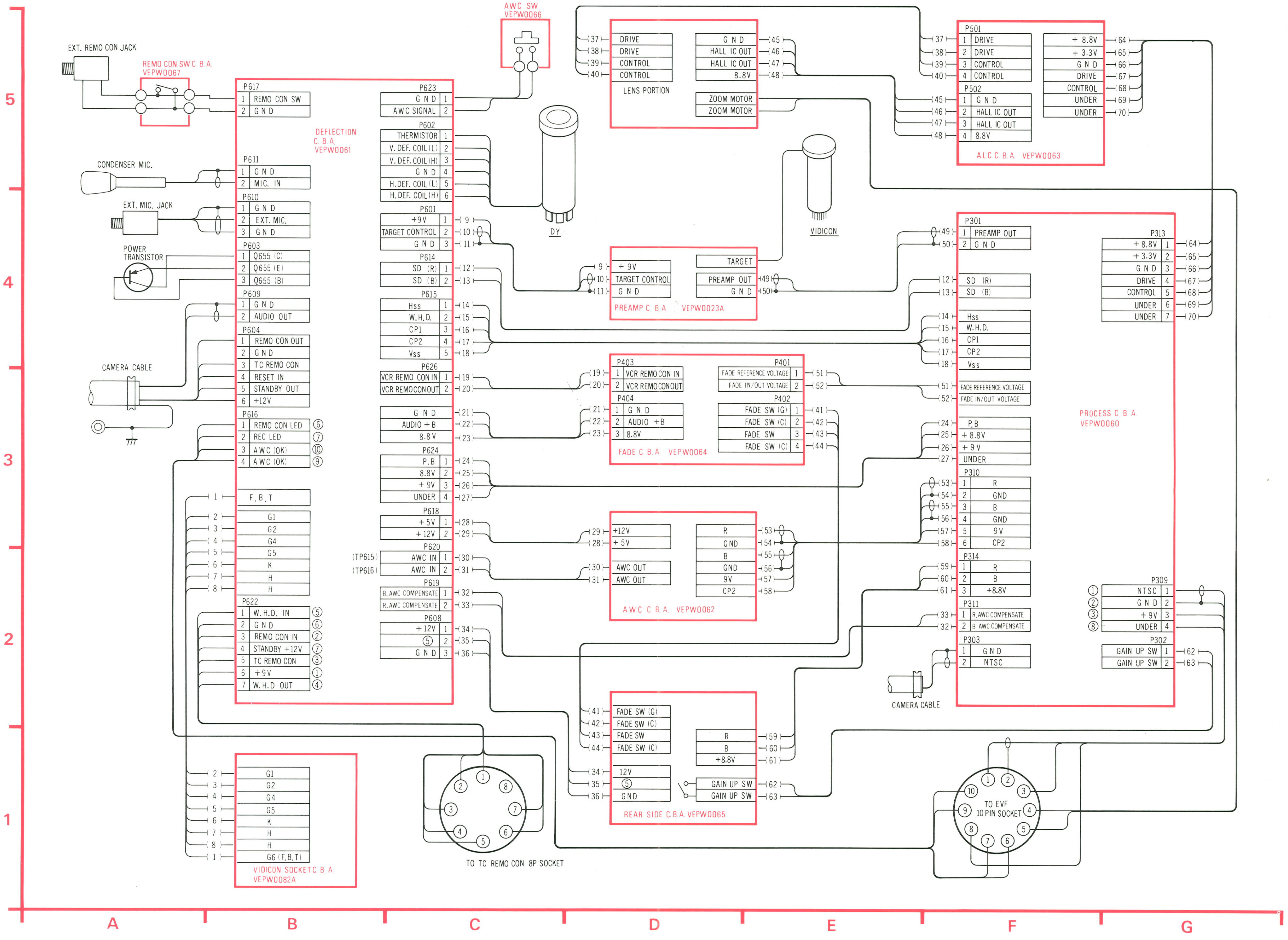

Process Circuit Board
(VEPW0060)

Right Side View I


Deflection Circuit Board
(VEPW0061)


Fader Circuit Board(VEPW0064)
Vidicon Socket Circuit Board
(VEPW0082A)
AWC Circuit Board(VEPW0062)
Pre-Amp Circuit Board
(VEPW0023A)

CAMERA UNIT INTERCONNECTION SCHEMATIC DIAGRAM


5
4
3
2
1
A
B
C
D
E
F
G
EXT. REMO CON JACK
REMO CON SW C. B. A VEPW0067
AWC SW VEPW0066
CONDENSER MIC.
EXT. MIC. JACK
POWER TRANSISTOR
CAMERA CABLE
DEFLECTION C. B. A VEPW0061
P617
1 REMO CON SW
2 G N D
P611
1 G N D
2 MIC. IN
P610
1 G N D
2 EXT. MIC.
3 G N D
P603
1 Q655 (C)
2 Q655 (E)
3 Q655 (B)
P609
1 G N D
2 AUDIO OUT
P604
1 REMO CON OUT
2 G N D
3 TC REMO CON
4 RESET IN
5 STANDBY OUT
6 +12V
P616
1 REMO CON LED ⑥
2 REC LED ⑦
3 AWC (OK) ⑩
4 AWC (OK) ⑨
F. B. T
G1
G2
G4
G5
K
H
H
P622
1 W. H. D. IN ⑤
2 G N D ⑥
3 REMO CON IN ②
4 STANDBY +12V ⑦
5 TC REMO CON ③
6 +9V ①
7 W. H. D OUT ④
P623
G N D 1
AWC SIGNAL 2
P602
THERMISTOR 1
V. DEF. COIL (L) 2
V. DEF. COIL (H) 3
G N D 4
H. DEF. COIL (L) 5
H. DEF. COIL (H) 6
P601
+9V 1
TARGET CONTROL 2
G N D 3
P614
SD (R) 1
SD (B) 2
P615
Hss 1
W. H. D. 2
CP1 3
CP2 4
Vss 5
P626
VCR REMO CON IN 1
VCR REMO CON OUT 2
G N D
AUDIO + B
8.8 V
P624
P. B 1
8.8V 2
+ 9V 3
UNDER 4
P618
+ 5V 1
+ 12V 2
P620
(TP615) AWC IN 1
(TP616) AWC IN 2
P619
B. AWC COMPENSATE 1
R. AWC COMPENSATE 2
P608
+ 12V 1
⑤ 2
G N D 3
DY
VIDICON
DRIVE
DRIVE
CONTROL
CONTROL
G N D
HALL IC OUT
HALL IC OUT
8.8V
LENS PORTION
ZOOM MOTOR
ZOOM MOTOR
P501
1 DRIVE
2 DRIVE
3 CONTROL
4 CONTROL
P502
1 G N D
2 HALL IC OUT
3 HALL IC OUT
4 8.8V
+ 8.8V
+ 3.3V
G N D
DRIVE
CONTROL
UNDER
UNDER
ALC C. B. A VEPW0063
+ 9V
TARGET CONTROL
G N D
TARGET
PREAMP OUT
G N D
PREAMP C. B. A VEPW0023A
P403
1 VCR REMO CON IN
2 VCR REMO CON OUT
P404
1 G N D
2 AUDIO +B
3 8.8V
P401
FADE REFERENCE VOLTAGE 1
FADE IN/OUT VOLTAGE 2
P402
FADE SW (G) 1
FADE SW (C) 2
FADE SW 3
FADE SW (C) 4
FADE C. B. A VEPW0064
+12V
+ 5V
AWC OUT
AWC OUT
R
GND
B
GND
9V
CP2
AWC C. B. A VEPW0062
FADE SW (G)
FADE SW (C)
FADE SW
FADE SW (C)
R
B
+8.8V
12V
⑤
GND
GAIN UP SW
GAIN UP SW
REAR SIDE C. B. A VEPW0065
P301
1 PREAMP OUT
2 G N D
SD (R)
SD (B)
Hss
W. H. D.
CP1
CP2
Vss
FADE REFERENCE VOLTAGE
FADE IN/OUT VOLTAGE
P. B
+ 8.8V
+ 9 V
UNDER
P310
1 R
2 GND
3 B
4 GND
5 9V
6 CP2
P314
1 R
2 B
3 +8.8V
P311
1 R. AWC COMPENSATE
2 B. AWC COMPENSATE
P303
1 G N D
2 NTSC
P313
+ 8.8V 1
+ 3.3V 2
G N D 3
DRIVE 4
CONTROL 5
UNDER 6
UNDER 7
PROCESS C. B. A VEPW0060
P309
① NTSC 1
② G N D 2
③ + 9V 3
⑧ UNDER 4
P302
GAIN UP SW 1
GAIN UP SW 2
CAMERA CABLE
G1
G2
G4
G5
K
H
H
G6 (F. B. T)
VIDICON SOCKET C. B. A VEPW0082A
TO TC REMO CON 8P SOCKET
TO EVF 10 PIN SOCKET

ORDER NO. VRD-8105-543

Service Manual

Color Video Camera

PK-751

Vol. 5

Exploded Views Replacement Parts List

SPECIFICATIONS:

Power Source:	DC 12V ± 10% AC 120V ± 10%, 60Hz ± 0.5% (with Power Supply Unit)
Power Consumption: (with E.V.F)	DC 7.2W at 12V (Battery) DC 0.7W at Standby
Vidicon Tube System:	2/3″ frequency separation single tube system (built-in stripe filter)
Signal Carrier Frequency:	3.58MHz
Focus System:	Electro-static type
Lens Mounting:	Built-in zoom lens (not "C" mount)
Lens:	6:1 zoom lens with auto/manual iris control. Auto zoom lens and macro construction. F: 1.6, f: 12mm—72mm d: 1m—infinity
Light Sensitivity:	Minimum light intensity on optical image: 80 Lux (F: 1.6) Optimum light intensity on optical image: 90 Lux
Video Output Level:	1.0Vp-p, 75Ω (M type coaxial connector) (Standard NTSC color signal)
Sync. System:	Internal Sync: RS-170
Signal to Noise Ratio:	Greater than 43dB (luminance signal)
Horizontal Resolution:	More than 240 lines
Color Temperature Control:	2 ~~step~~ switch (indoor, outdoor) & Auto adjust

Microphone:	Condenser Microphone
Audio Output Level:	–20dB, Hi-impedance
Audio Output Impedance:	High impedance (1KΩ)
External Microhpone Input Impedance:	600Ω
Electronic Viewfinder:	Monochrome 1.5 inch CRT
Operating Temperature:	5°C to 40°C
Operating Humidity:	10% to 75%
Operating Position:	Normal position only
Weight:	Camera Head with E.V.F 6.1 lbs (with Lens, 7ft cable & shoulder pad/handle grip) AC adaptor (option) 2.4 lbs
Demensions:	Camera Head with E.V.F 7″(W) × 8″(H) × 13″(D) 177mm(W) × 210mm(H) × 318mm(D) AC adaptor (option) 3″(W) × 3″(H) × 6″(D) 80mm(W) × 75mm(H) × 149mm(D)

Weight and dimensions shown are approximate.
Specifications are subject to change without notice.

Panasonic®

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Ontario, L4W 2T3

Panasonic Sales Company,
Division of Matsushita Electric
of Puerto Rico, Inc.
Ave, 65 De Infanteria, KM 9.7
Victoria Industrial Park
Carolina, Puerto Rico 00630

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5. Electronic Viewfinder Section 5-5
6. Packing Parts Section 5-6

MECHANICAL REPLACEMENT PARTS LIST (CAMERA UNIT) 5-7

ELECTRICAL REPLACEMENT PARTS LIST (CAMERA UNIT) .... 5-8∿5-18

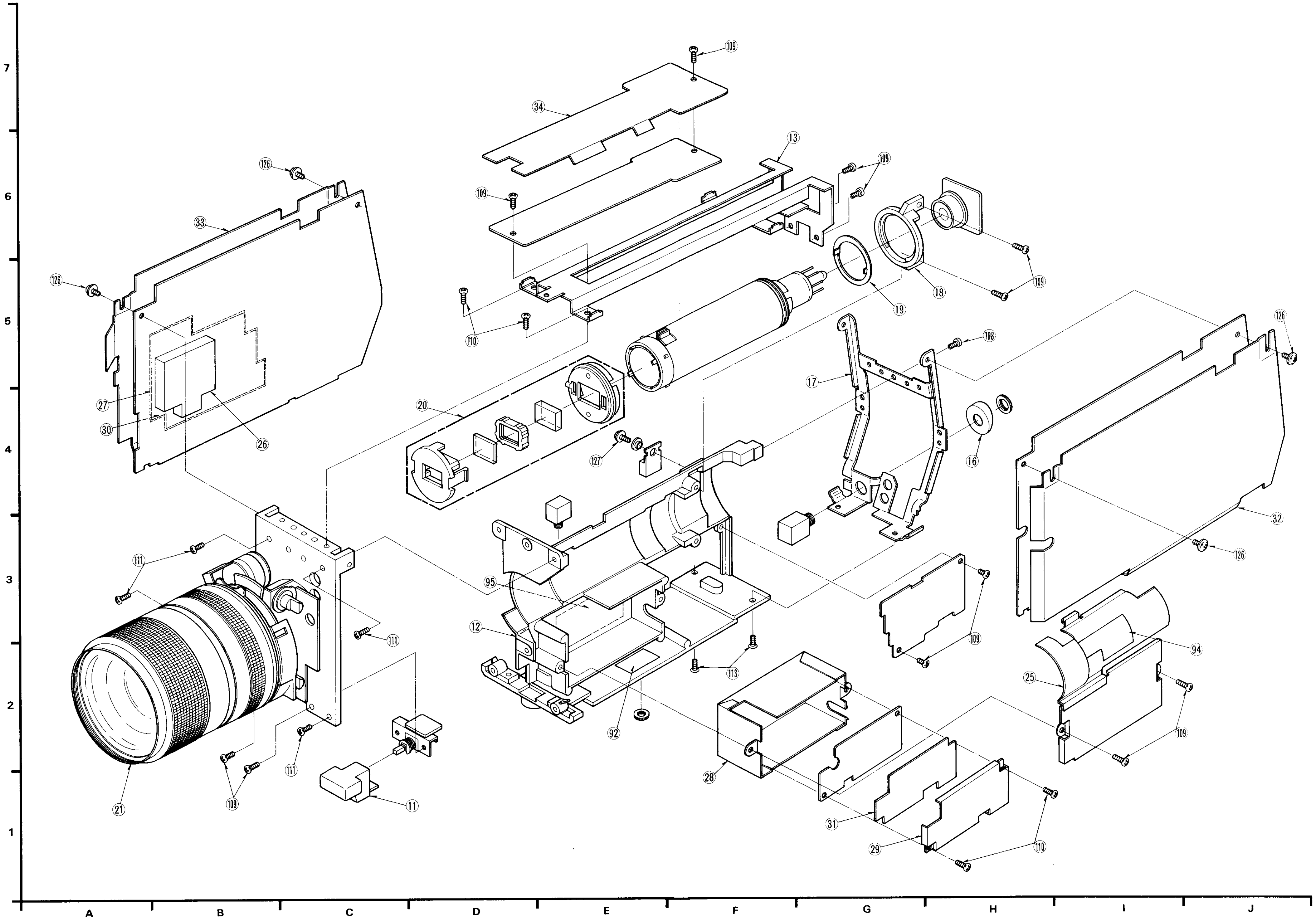
EXPLODED VIEWS (Power Supply Unit/Optional Accessory)

1. Power Supply Unit Section 5-19
2. Packing Parts Section 5-20

MECHANICAL REPLACEMENT PARTS LIST (POWER SUPPLY UNIT) 5-20

ELECTRICAL REPLACEMENT PARTS LIST (POWER SUPPLY UNIT) 5-20

EXPLODED VIEW ❶ *Camera Unit Section*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34
13
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109
109
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126
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110
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126
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27
20
30
26
127
16
32
126
111
95
109
12
111
113
94
25
92
109
28
109
111
11
21
31
110
29
7
6
5
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1
A
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C
D
E
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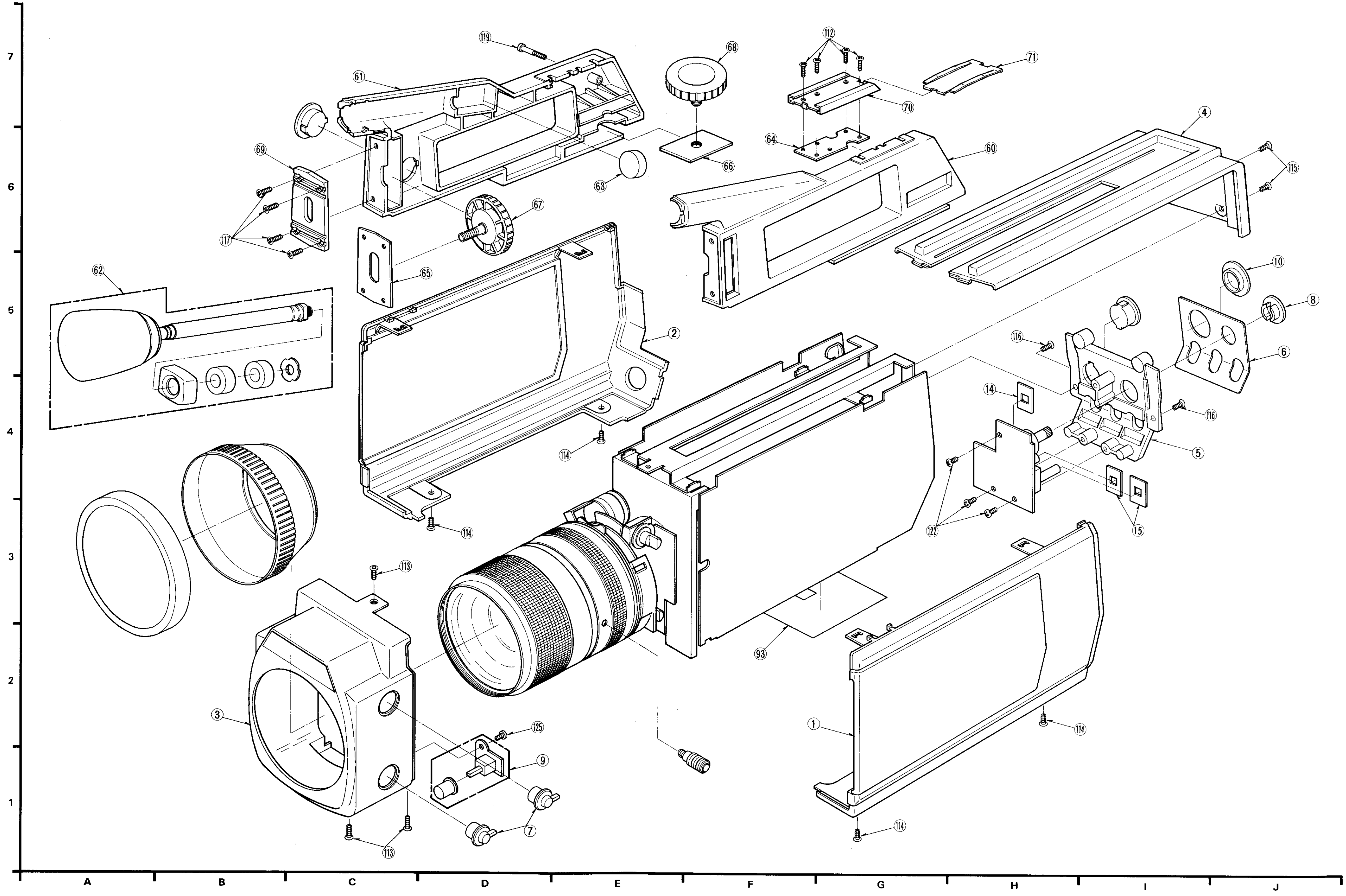
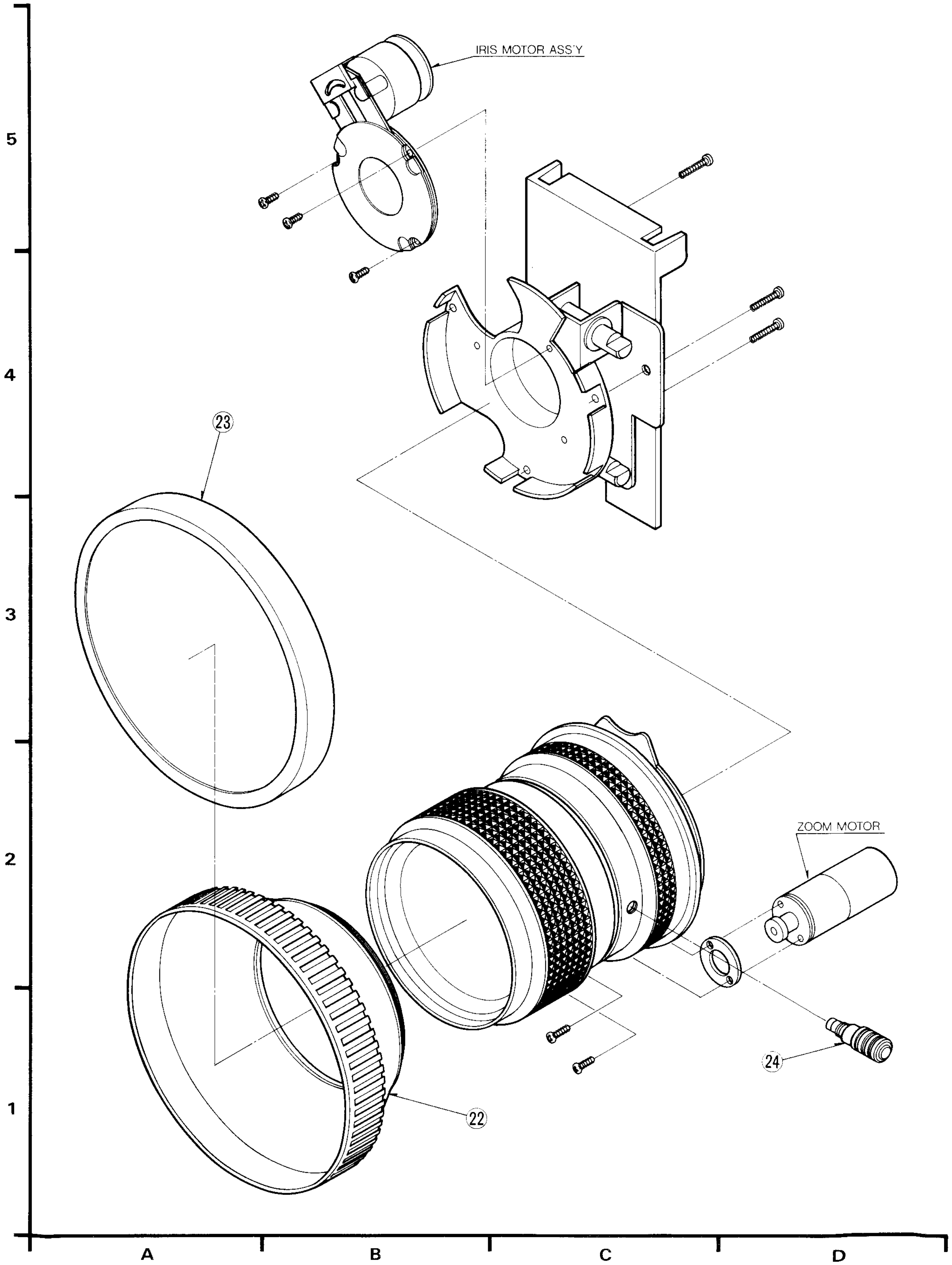
G
H
I
J

❷ *Camera Unit Casing Parts Section*

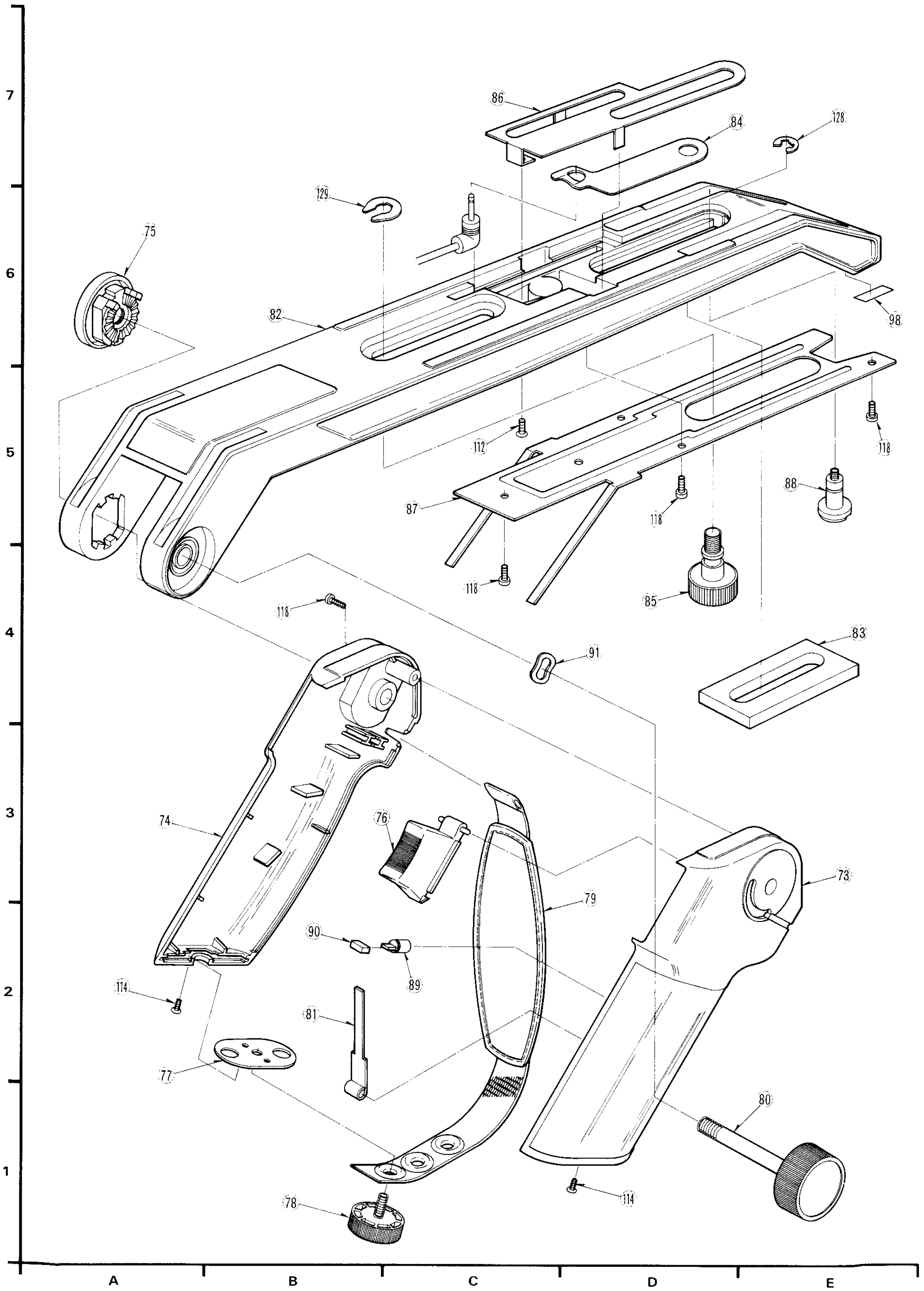

7
6
5
4
3
2
1
119
61
68
112
71
70
4
64
60
69
66
63
115
67
117
65
10
62
8
2
116
6
14
116
5
114
122
15
114
113
93
3
125
9
1
114
7
113
114
A
B
C
D
E
F
G
H
I
J

❸ Lens Section



IRIS MOTOR ASS'Y
5
4
㉓
3
2
ZOOM MOTOR
㉔
1
㉒
A
B
C
D

❹ *Shoulder Grip Unit Section*



86
84
128
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75
82
98
112
118
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87
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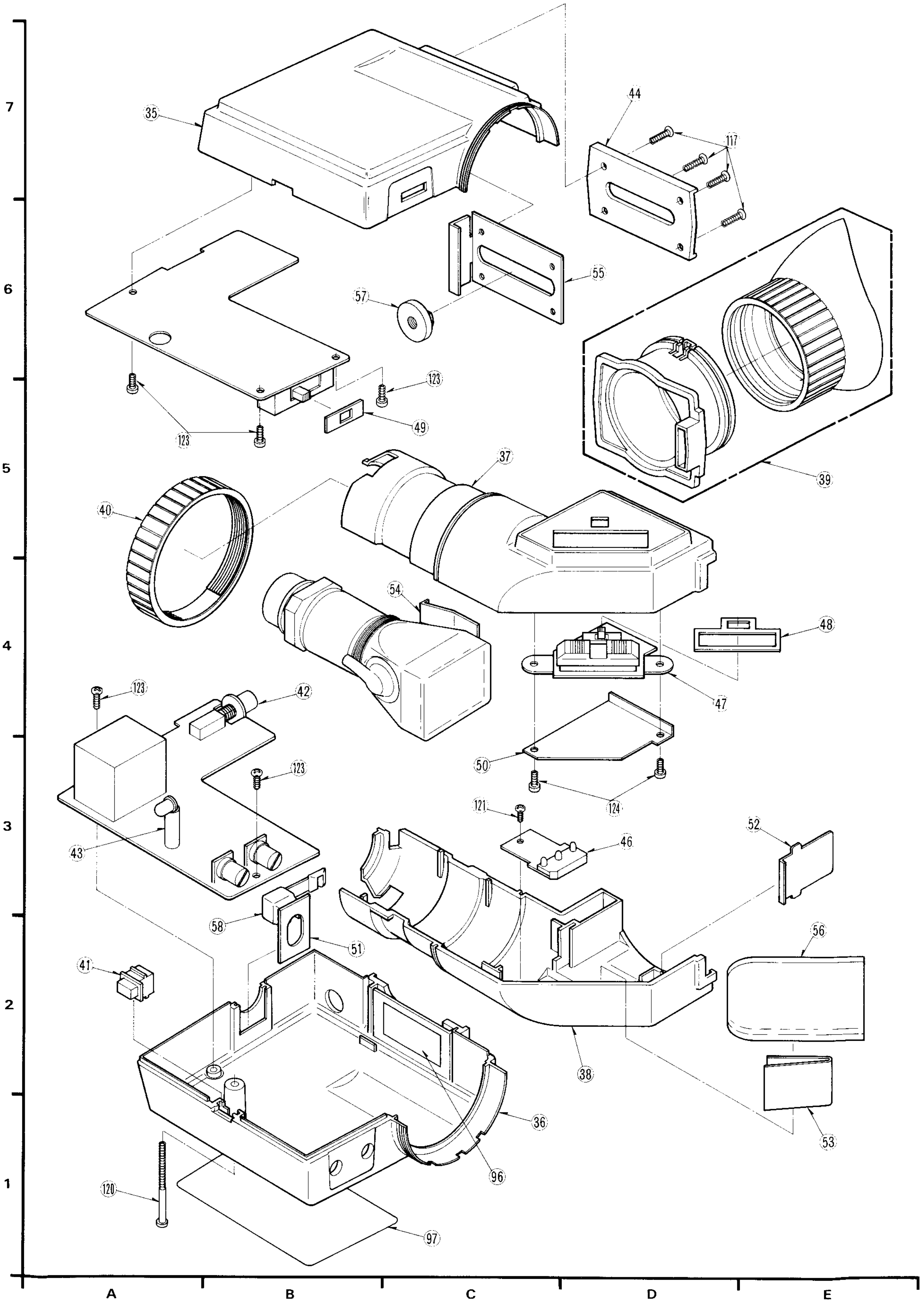
85
118
83
91
74
76
73
79
90
89
114
81
77
80
114
78
7
6
5
4
3
2
1
A
B
C
D
E

❺ *Electronic Viewfinder Section*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6
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3
2
1
35
44
117
55
57
123
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123
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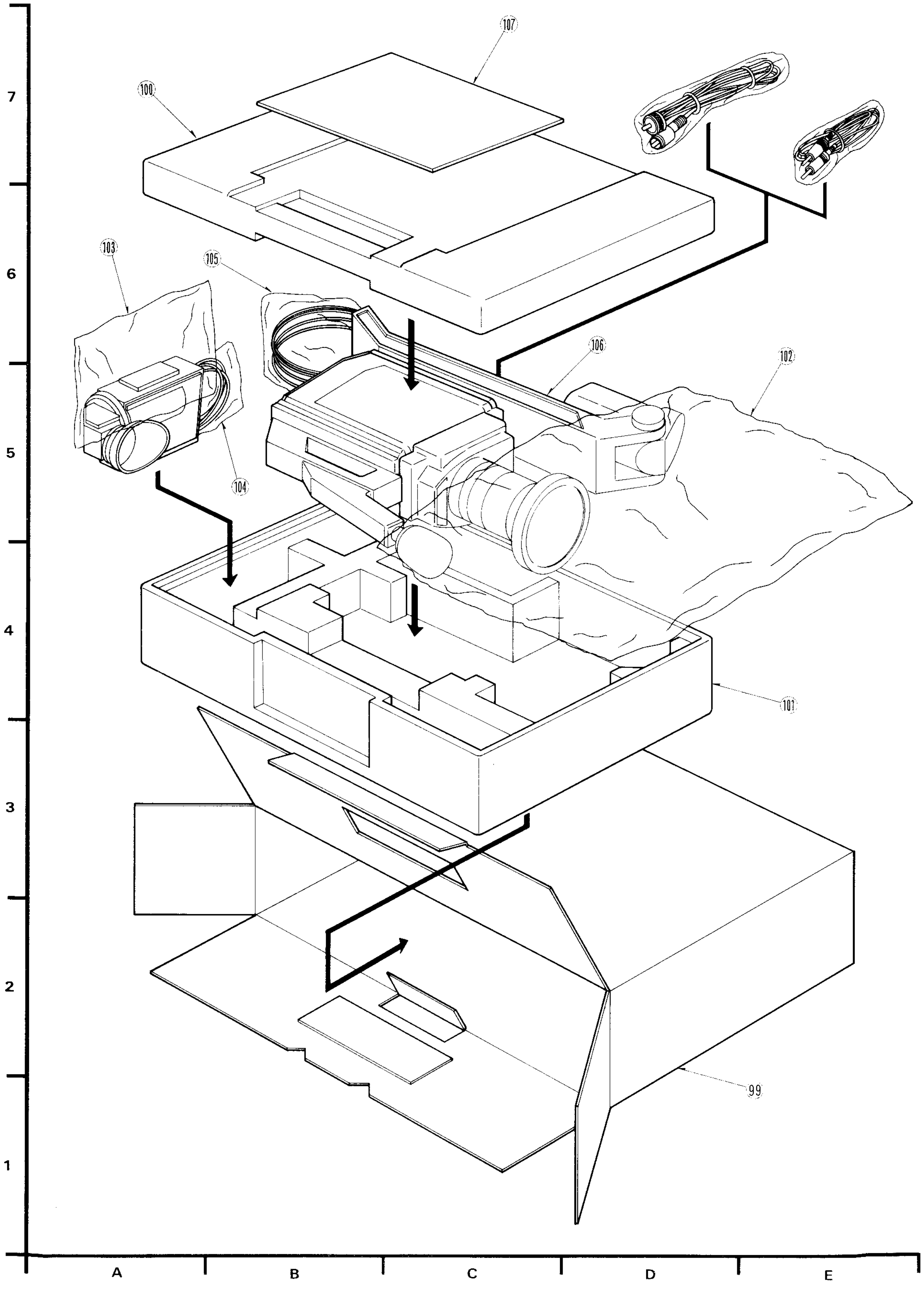
47
123
42
123
50
124
121
46
52
43
58
51
56
41
38
36
53
96
120
97
A
B
C
D
E

❻ Packing Parts Section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MECHANICAL REPLACEMENT PARTS LIST

Note: *Be sure to make your orders of replacement parts according to this list.
○ . . . . Available replacement part
X . . . . Not available as replacement
□ . . . . Only available on special order

Item No.	Drawing No.	Description	Pcs/ Set	Availa- bility	Part No.	Remark
		C S U				
1		RIGHT SIDE COVER ASS'Y	1	o	VYKW0170	
2		LEFT SIDE COVER ASS'Y	1	o	VYKW0171	
3		FRONT COVER ASS'Y	1	o	VYKW0161	
4		TOP COVER ASS'Y	1	o	VYKW0188	
5		REAR COVER	1	o	VKGW0136	
6		REAR PANEL	1	o	VGPW0085	
7		IRIS/FILTER KNOB	2	o	VGTW0017	
8		VOLUME KNOB	1	o	VGTW0027	
9		WB SW KNOB ASS'Y	1	o	VESW0006	
10		PEMO. CON. CAP	1	o	VKGW0152	
11		REMO. CON. BUTTON	1	o	VGTW0021	
12		MAIN CHASSIS	1	o	VMKW0015	
13		TOP CHASSIS	1	o	VMAW0063	
14		STAND BY SPACER	1	o	VMXW0040	
15		FADE SPACER	2	o	VMXW0041	
16		EXT MIC SPACER	1	o	VMXW0042	
17		REAR CHASSIS	1	o	VMKW0017	
18		DY HOLDER (A)	1	o	VMDW0018	
19		DY HOLDER (B)	1	o	VMBW0017	
20		FILTER FIXTURE ASS'Y	1	o	VXEW0003	
21		6-MULTIPLE POWER ZOOM LENS	1	o	VFLW0029	
22		LENS HOOD	1	o	VKUW0036	
23		HOOD CAP	1	o	VKUW0037	
24		LENS LEVER	1	o	VMLW0008	
		CASE				
25		TARGET SHIELD COVER	1	o	VSCW0036	
26		14MHZ SHIELD CASE (A)	1	o	VSCW0034	
27		14MHZ SHIELD CASE (B)	1	o	VSCW0035	
28		PRE-AMP SHIELD CASE	1	o	VSCW0027	
29		PRE-AMP SHIELD CASE (B)	1	o	VSCW0020	
30		14MHZ FIBER SHEET	1	o	VMZW0033	
31		PRE-AMP FIBER SHEET (B)	1	o	VMZW0018	
32		BARRIER (A)	1	o	VMZW0034	
33		BARRIER (B)	1	o	VMZW0035	
34		FADE BARRIER	1	o	VMZW0039	
		SIDE EVF				
35		EVF TOP COVER ASS'Y	1	o	VYKW0135	
36		EVF BOTTOM COVER ASS'Y	1	o	VYKW0145	
37		CRT CASE (A) ASS'Y	1	o	VYKW0147	
38		CRT CASE (B) ASS'Y	1	o	VYKW0148	
39		EVF DOOR ASS'Y	1	o	VYKW0149	
40		EVF RING	1	o	VMDW0014	
41		TALLY DIFFUSION PIECE	1	o	VGQW0009	
42		TALLY SW BUTTON	1	o	VGTW0020	
43		TALLY LAMP HOLDER	1	o	VMGW0025	
44		EVF FIXING PIECE (A)	1	o	VMXW0033	
45		CRT FIXING BUSH	1	o	VMGW0016	
46		LED SPACER ASS'Y	1	o	VXFW0006	
47		POWER ZOOM SW ASS'Y	1	o	VEKW0176	
48		ZOOM SW SPACER	1	o	VMXW0038	
49		EVF TURNING SW SPACER	1	o	VMXW0037	
50		POWER ZOOM FIBER	1	o	VMZW0026	
51		CORD STOPPER CHASSIS	1	o	VMAW0050	
52		EVF SPRING	1	o	VMBW0012	
53		EVF MIRROR SPRING	1	o	VMBW0013	
54		GRAND SPRING	1	o	VMAW0051	
55		CASE STOP ANGLE	1	o	VMAW0049	
56		EVF MIRROR	1	o	VMRW0001	
57		EVF MOVEABLE PIECE	1	o	VMXW0036	
58		CORD BUSH	1	o	VDBW0004	
		HANDLE				
59		HANDLE UNIT	1	o	(VYHW0038)	
60		RIGHT HANDLE	1	o	VKHW0024	
61		LEFT HANDLE	1	o	VKHW0025	
62		MIC KIT	1	o	VXMW0017	
63		MIC SPONGE (B)	1	o	VMFW0012	
64		SHOE FIXING CHASSIS	1	o	VMKW0018	
65		HANDLE FIXING ANGLE (A)	1	o	VMAW0047	
66		HANDLE FIXING ANGLE (B)	1	o	VMAW0048	
67		HANDLE KNOB (A)	1	o	VGTW0018	
68		HANDLE KNOB (B)	1	o	VGTW0019	
69		HANDL FIXING PIECE (B)	1	o	VMXW0034	
70		ACCESSORIES SHOE	1	o	VGQW0012	
71		SHOE SPRING	1	o	VMBW0015	
		SHOULDER GRIP				
72		SHOULDER GRIP UNIT	1	o	(VYHW0035)	
73		RIGHT SHOULDER GRIP	1	o	VKHW0022	
74		LEFT SHOULDER GRIP ASS'Y	1	o	VYHW0039	
75		SHAFT COVER ASS'Y	1	o	VYFW0001	
76		REMO.CON.BUTTON	1	o	VGTW0025	
77		STRAP FIXING ANGLE	1	o	VHDW0017	
78		STRAP SCREW	1	o	VHDW0015	
79		HAND STRAP	1	o	VFBW0006	
80		ROCK KNOB	1	o	VGTW0024	
81		REMO.CON.SPRING	1	o	VMBW0011	
82		SHOULDER	1	o	VKHW0026	
83		CUSHION C	1	o	VMFW0010	
84		JOINT PLATE	1	o	VMAW0058	
85		SHOULDER SCREW	1	o	VMSW0014	
86		COSMETIC PLATE (A)	1	o	VMAW0059	
87		COSMETIC PLATE (B)	1	o	VMAW0060	
88		HANDLE ROLLER	1	o	VMSW0013	
89		REMO. CON. SWITCH	1	o	KBM-801C	
90		SWITCH RUBBER	1	o	VMGW0009	
91		WAVE WASHER	1	o	WW-8	
		LABEL				
92		CSU CHASSIS LABEL	1	o	VQLW0074	
93		CAUTION LABEL	1	o	VQLW0187	
94		CAUTION LABEL	1	o	VQLW0106	
95		ATTENTION LABEL	1	o	VQLW0167	
96		EVF CHASSIS LABEL	1	o	VQLW0074	
97		CAUTION LABEL	1	o	VQLW0184	
98		SHOULDER LABEL	1	o	VQLW0186	
		PACKING CASE				
99		PACKING CASE	1	o	VPKW0098	
100		CUSHION TOP	1	o	VPGW0049	
101		CUSHION BOTTOM	1	o	VPGW0050	
102		POLY BAG FOR CAMERA HEAD	1	o	XZB36X55A02	
103		POLY BAG FOR EVF	1	o	XZB22X42A02	
104		POLY BAG FOR EVF CABLE	1	o	XZB10X15A02	
105		POLY BAG FOR CAMERA CABLE	1	o	XZB15X28A02	
106		HANDLE KIT	1	o	VYHW0003	
107		FAN BAG KIT	1	o	VQTW0040	
		SCREW				
108		BIND SCREW 3øx6mm	1	o	XSB3+6FXK	
109		3øx6mm	12	o	XSB3+6FU	
110		2.6øx4mm	4	o	XSB26+4FU	
111		PAN HEAD MACHINE SCREW				
		3øx8mm	4	o	XSN3+8FU	
112		FLUSH HEAD MACHINE SCREW				
		2øx6.8mm	5	o	XSS2+68FXK	
113		3øx6mm	5	o	XSS3+6FU	
114		3øx6mm	6	o	XSS3+6FXK	

ELECTRICAL REPLACEMENT PARTS LIST

Note:
1. Be sure to make your orders of replacement parts according to this list.
2. IMPORTANT SAFETY NOTICE
   Components identified by shade have special characteristics important for safety. When replacing any of these components, use only the original ones.
3. Unless otherwise specified:
   All resistors are in OHMS (Ω), 1/4w, ±5% carbon, K = 1,000Ω, M = 1,000KΩ.
   All capacitors are in MICROFARADS (μF), ±10%, P = μμF.
   All coils are in MICROHENRIES (μH), m = 10³
4. C.B.A: Circuit Board Assembly.
5. C.B: Circuit Board.

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
	VEPW0023A	PRE-AMP C.B.A.	1	
	VEPW0060	PROCESS C.B.A.	1	
	VEPW0061	DEFLECTION C.B.A.	1	
	VEPW0062	A.W.C C.B.A.	1	
	VEPW0063	A.L.C C.B.A.	1	
	VEPW0064	FADER C.B.A.	1	
	VEPW0065	REAR SIDE C.B.A.	1	
	VEPW0066	A.W.C. SW C.B.A.	1	
	VEPW0067	REMO. CON. SW C.B.A.	1	
	VEPW0071	EVF H. C.B.A.	1	
	VEPW0072	EVF V. C.B.A.	1	
	VEPW0073	LED SW C.B.A	1	
	VEPW0075	ZOOM SW C.B.A.	1	
	VEPW0082A	VIDICON SOCKET C.B.A.	1	
		PROCESS C.B.A.		
		Integrated Circuits		
IC301	AN6041		1	
IC302	KK11A66A or	Hi-Mic	1	
	EHM-KK11A66A			
IC303	AN6040		1	
IC304	K721W44 or	Hi-Mic	1	
	EHM-K721W44			
IC305	AN6011		1	
IC306	MN6064		1	
IC307	AN6553		1	
IC308	AN6031		1	
IC309	KK14W31 or	Hi-Mic	1	
	EHM-KK14W31			
IC310	AN6020		1	
		Transistors		
Q301	2SD636(Q,R)		1	
Q302-304	2SC2206(C)		3	
Q305	2SD636(Q,R)		1	
Q306	2SC2206(C)		1	
Q307	2SD661(T)		1	
Q308,309	2SB641(Q,R)		1	
Q310-312	2SD636(Q,R)		3	
Q313	2SC2377(C,D)		1	
Q314,315	2SD636(Q,R)		2	
Q316	2SB641(Q,R)		1	
Q317-322	2SD636(Q,R)		6	
Q323	2SB641(Q,R)		1	
Q324,325	2SD636(Q,R)		2	
Q326	2SC2377(C,D)		1	
Q327	2SD636(Q,R)		1	
Q328	2SA838(B,C)		1	
Q329	2SD636(Q,R)		1	
Q331	2SC2377(C,D)		1	
Q333	2SC2377(C,D)		1	
Q334	2SB641(Q,R)		1	
Q335	2SD636(Q,R)		1	
		Diodes		
D301-304	MA165		4	
D305	OA91		1	
D306	MA165		1	
D307	MZ303A		1	
D308	MA165		1	
D323	MA165		1	
		Resistors		
R301	ERD10TJ272	2.7K	1	
R302	ERD10TJ222	2.2K	1	
R303	ERD10TJ332	3.3K	1	
R304	ERD10TJ561	560	1	
R305	ERD10TJ392	3.9K	1	
R306	ERD10TJ561	560	1	
R307	ERD10TJ102	1K	1	
R308	ERD10TJ472	4.7K	1	
R309	ERD10TJ562	5.6K	1	
R310	ERD10TJ152	1.5K	1	
R311	ERD10TJ122	1.2K	1	
R312	ERD10TJ822	8.2K	1	
R313	ERD10TJ102	1K	1	
R314	ERD10TJ272	2.7K	1	
R315	ERD10TJ182	1.8K	1	
R316	ERD10TJ271	270	1	
R317	ERD10TJ822	8.2K	1	
R318,319	ERD10TJ472	4.7K	2	
R320	ERD10TJ682	6.8K	1	
R321	ERD10TJ152	1.5K	1	
R322	ERD10TJ102	1K	1	
R323	ERD10TJ472	4.7K	1	
R324,325	ERD10TJ682	6.8K	2	
R326	ERD10TJ562	5.6K	1	
R327	ERD10TJ331	330	1	
R328	ERD10TJ562	5.6K	1	
R330	ERD10TJ103	10K	1	
R331	ERD10TJ153	15K	1	
R332	ERD10TJ103	10K	1	
R333	ERD10TJ562	5.6K	1	
R334	ERD10TJ222	2.2K	1	
R335	ERD10TJ561	560	1	
R336	ERD10TJ680	68	1	
R337,338	ERD10TJ222	2.2K	2	
R339	ERD10TJ223	22K	1	
R340	ERD10TJ103	10K	1	
R341,342	ERD10TJ561	560	2	
R343	ERD10TJ391	390	1	
R344	ERD10TJ333	33K	1	
R345	ERD10TJ562	5.6K	1	
R346	ERD10TJ102	1K	1	
R347,348	ERD10TJ332	3.3K	2	
R349	ERD10TJ123	12K	1	
R350	ERD10TJ332	3.3K	1	
R351	ERD10TJ561	560	1	
R352	ERD10TJ331	330	1	

Ref. No.		Part No.	Part Name & Description	Pcs / Set	Remarks
R353		ERD10TJ152	1.5K	1	
R354		ERD10TJ562	5.6K	1	
R355		ERD10TJ152	1.5K	1	
R356		ERD10TJ102	1K	1	
R357		ERD10TJ561	560	1	
R358		ERD10TJ821	820	1	
R359		ERD10TJ103	10K	1	
R360		ERD10TJ822	8.2K	1	
R361,362		ERD10TJ103	10K	2	
R363		ERD10TJ473	47K	1	
R364		ERD10TJ821	820	1	
R365		ERD10TJ102	1K	1	
R366		ERD10TJ122	1.2K	1	
R367		ERD10TJ221	220	1	
R368		ERD10TJ124	120K	1	
R369		ERD10TJ104	100K	1	
R371		ERD10TJ103	10K	1	
R372		ERD10TJ151	150	1	
R373		ERD10TJ103	10K	1	
R374		ERD10TJ684	680K	1	
R375		ERD10TJ221	220	1	
R376		ERD10TJ223	22K	1	
R378		ERD10TJ821	820	1	
R379		ERD10TJ102	1K	1	
R380		ERD10TJ182	1.8K	1	
R381,382		ERD10TJ102	1K	2	
R383		ERD10TJ104	100K	1	
R384,385		ERD10TJ471	470	2	
R386		ERD10TJ822	8.2K	1	
R387		ERD10TJ181	180	1	
R388		ERD10TJ822	8.2K	1	
R389,390		ERD10TJ102	1K	2	
R392-395		ERD10TJ102	1K	4	
R397,398		ERD10TJ102	1K	2	
R399		ERD10TJ562	5.6K	1	
R3100		ERD10TJ121	120	1	
R3101		ERD10TJ681	680	1	
R3102		ERD10TJ122	1.2K	1	
R3103		ERD10TJ222	2.2K	1	
R3104		ERD10TJ223	22K	1	
R3105		ERD10TJ101	100	1	
R3106		ERD10TJ222	2.2K	1	
R3107		ERD10TJ153	15K	1	
R3108		ERD10TJ331	330	1	
R3109		ERD10TJ271	270	1	
R3111		ERD10TJ102	1K	1	
R3112		ERD10TJ153	15K	1	
R3113		ERD10TJ102	1K	1	
R3114		ERD10TJ821	820	1	
R3115		ERD10TJ823	82K	1	
R3116		ERD10TJ122	1.2K	1	
R3117		ERD10TJ153	15K	1	
R3118		ERD10TJ472	4.7K	1	
R3119		ERD10TJ122	1.2K	1	
R3120		ERD10TJ392	3.9K	1	
R3121		ERD10TJ222	2.2K	1	
R3122		ERD10TJ103	10K	1	
R3123		ERD10TJ273	27K	1	
R3124		ERD10TJ562	5.6K	1	
R3125		ERD10TJ103	10K	1	
R3126		ERD10TJ272	2.7K	1	
R3128		ERD10TJ471	470	1	
R3129		ERD10TJ121	120	1	
R3130		ERD10TJ680	68	1	

Ref. No.		Part No.	Part Name & Description	Pcs / Set	Remarks
R3131		ERD10TJ562	5.6K	1	
R3132		ERD10TJ152	1.5K	1	
R3134		ERD10TJ102	1K	1	
R3135		ERD10TJ102	1K	1	
R3136		ERD10TJ105	1M	1	
R3137		ERD10TJ561	560	1	
R3138		ERD10TJ222	2.2K	1	
R3139		ERD10TJ272	2.7K	1	
R3140		ERD10TJ102	1K	1	
R3143		ERD10TJ561	560	1	
R3144		ERD10TJ472	4.7K	1	
R3145,3146		ERD10TJ561	560	2	
R3148,3149		ERD10TJ272	2.7K	2	
R3150		ERD10TJ561	560	1	
R3151		ERD10TJ223	22K	1	
R3152		ERD10TJ822	8.2K	1	
R3153		ERD10TJ392	3.9K	1	
R3154		ERD10TJ472	4.7K	1	
R3155		ERD10TJ333	33K	1	
R3156,3157		ERD10TJ561	560	2	
R3158		ERD10TJ272	2.7K	1	
R3159		ERD10TJ331	330	1	
R3160		ERD10TJ681	680	1	
R3161		ERD10TJ223	22K	1	
R3162		ERD10TJ272	2.7K	1	
R3163		ERD10TJ473	47K	1	
R3164		ERD10TJ222	2.2K	1	
R3165		ERD10TJ102	1K	1	
R3166		ERD10TJ222	2.2K	1	
R3167		ERD10TJ183	18K	1	
R3169		ERD10TJ223	22K	1	
R3170		ERD10TJ472	4.7K	1	
R3171		ERD10TJ561	560	1	
R3186		ERD10TJ562	5.6K	1	
R3188		ERD10TJ102	1K	1	
R3192		ERD10TJ222	2.2K	1	
R3193,3194		ERD10TJ272	2.7K	2	
R3195		ERD10TJ222	2.2K	1	
R3196		ERD10TJ473	47K	1	
R3197		ERD10TJ222	2.2K	1	
R3203		ERD10TJ153	15K	1	
R3204		ERD10TJ102	1K	1	
R3208		ERD10TJ184	180K	1	
R3209		ERD10TJ471	470	1	
R3218		EF02FHJ332S	Thermistor 3.3K	1	
R3133		ERD10TJ102	1K	1	
R3142		ERD10TJ105	1M	1	
R3202		ERD10TJ183	18K	1	
R3219		ERD10TJ562	5.6K	1	
			Variable Resistors		
VR301		EVN38CA00B14	10K	1	
VR302		EVN38CA00B53	5K	1	
VR303		EVN38CA00B13	1K	1	
VR304		EVN38CA00B33	3K	1	
VR305		EVN38CA00B52	500	1	
VR306		EVN38CA00B14	10K	1	
VR307		EVN38CA00B52	500	1	
VR308-311		EVN38CA00B14	10K	4	
VR312		EVN38CA00B13	1K	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
VR313	EVN38CA00B15	100K	1	
VR315	EVN38CA00B15	100K	1	
VR316	EVN38CA00B52	500	1	
VR317,318	EVN38CA00B52	500	2	
VR319	EVN38CA00B33	3K	1	
VR320	EVN38CA00B15	100K	1	
VR321	EVN38CA00B52	500	1	
VR322	EVN38CA00B33	3K	1	
VR323	EVN38CA00B15	100K	1	
VR324	EVN38CA00B34	30K	1	
		Capacitors		
C301	ECEA1AK330	Electrolytic 10V 33	1	
C302	ECQV05103JZ	Mylar 50V 0.01	1	
C303	ECCR1H220J	Ceramic 50V 22P	1	
C304	ECQV05103JZ	Mylar 0.01	1	
C305	ECCR1H220J	Ceramic 50V 22P	1	
C306	ECEA1EK100	Electrolytic 25V 10	1	
C307	ECEA1AK330	Electrolytic 10V 33	1	
C308	ECEA1AK470	Electrolytic 10V 47	1	
C309	ECEA1CK100	Electrolytic 16V 10	1	
C310	ECEA1AK330	Electrolytic 10V 33	1	
C311	ECEA0JK470	Electrolytic 6.3V 47	1	
C312	ECEA1HK010	Electrolytic 50V 1	1	
C313	ECCR1H270J5	Ceramic 50V 27P	1	
C314	ECEA0JK470	Electrolytic 6.3V 47	1	
C315	ECEA1AK220	Electrolytic 10V 22	1	
C316,317	ECEA0JK470	Electrolytic 6.3V 47	2	
C318	ECEA1AK470	Electrolytic 10V 47	1	
C320	ECCR1H820J5	Ceramic 50V 82P	1	
C321	ECEA1CK100	Electrolytic 16V 10	1	
C322	ECSF10E47	Tantalum 10V 47	1	
C323	ECCW1H080CC5	Ceramic 50V 8P	1	
C324,325	ECKR1H103ZF5	Ceramic 50V 0.01	2	
C326	ECV1ZW20X64	Trimmer 1W 20P	1	
C327,328	ECEA1HK010	Electrolytic 50V 1	2	
C331,332	ECEA1AK330	Electrolytic 10V 33	2	
C333	ECQV05103JZ	Mylar 50V 0.01	1	
C334	ECQM1H103MZ	Mylar 50V 0.01	1	
C335	ECQV05103JZ	Mylar 50V 0.01	1	
C336	ECQM1H103MZ	Mylar 50V 0.01	1	
C337	ECKR1H103ZF5	Ceramic 50V 0.01	1	
C339	ECKW1H561KB2	Ceramic 50V 560	1	
C340	ECQM1H103MZ	Mylar 50V 0.01	1	
C341	ECEA1AK330	Electrolytic 10V 33	1	
C342,343	ECEA0JK470	Electrolytic 6.3V 47	2	
C345	ECQV05563JZ	Mylar 50V 0.056	1	
C346	ECEA1AK470	Electrolytic 10V 47	1	
C347	ECEA1CK100	Electrolytic 16V 10	1	
C348	ECSF10E10	Tantalum 10V 10	1	
C349	ECQV05154JZ	Mylar 50V 0.15	1	
C350	ECEA0JK470	Electrolytic 6.3V 47	1	
C351	ECEA1AK330	Electrolytic 10V 33	1	
C352,353	ECCR1H820J5	Ceramic 50V 82P	2	
C354	ECKR1H103ZF5	Ceramic 50V 0.01	1	
C355	ECEA1AK330	Electrolytic 10V 33	1	
C356	ECCR1H270J5	Ceramic 50V 27P	1	
C357	ECV1ZW40X53N	Trimmer 1W 40P	1	
C360-363	ECCR1H820J5	Ceramic 50V 82P	4	
C364	ECKR1H102KB5	Ceramic 50V 0.001	1	
C365,366	ECEA0JK470	Electrolytic 6.3V 47	2	
C367	ECCR1H470J5	Ceramic 50V 47P	1	
C368	ECCR1H820J5	Ceramic 50V 82P	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
C369	ECCR1H271J	Ceramic 50V 270P	1	
C370,371	ECEA0JK470	Electrolytic 6.3V 47	2	
C372	ECCR1H820J5	Ceramic 50V 82P	1	
C373	ECEA1AK470	Electrolytic 10V 47	1	
C374	ECEA1HK010	Electrolytic 50V 1	1	
C375	ECEA1AK330	Electrolytic 10V 33	1	
C376	ECEA16N10U	Electrolytic 16V 10	1	
C377	ECSF35ER47	Tantalum 35V 0.47	1	
C378	ECEA0JK470	Electrolytic 6.3V 47	1	
C379	ECEA1HN1U	Electrolytic 50V 1	1	
C380	ECEA1CK100	Electrolytic 16V 10	1	
C381	ECQM1H103MZ	Mylar 50V 0.01	1	
C382	ECEA1ASS471	Electrolytic 10V 470	1	
C383	ECEA1HK010	Elertrolytic 50V 1	1	
C384	ECCR1H121JC5	Ceramic 50V 120P	1	
C385	ECCR1H121JC5	Ceramic 50V 120P	1	
C387	ECCR1H100D5	Ceramic 50V 10P	1	
C388	VCAMS50V103M	Mylar 50V 0.01	1	
C389	ECCR1H820J5	Ceramic 50V 82P	1	
C390	ECSF10E47	Tantalum 10V 47	1	
C391	ECCR1H270J5	Ceramic 50V 27P	1	
C392	ECQM1H103MZ	Mylar 50V 0.01	1	
C393	ECCR1H820J5	Ceramic 50V 82P	1	
C394	ECQM1H103MZ	Mylar 50V 0.01	1	
C396	ECEA1ASS101	Electrolytic 10V 100	1	
C348	ESCF10E10	Tantalum 10V 10	1	
C397	ECEA0JK470	Electrolytic 6.3V 47	1	
C398	ECEA1ASS101	Electrolytic 10V 100	1	
C399	ECEA0JK470	Electrolytic 6.3V 47	1	
C3100	ECEA1CK100	Electrolytic 16V 10	1	
C3102	ECEA1AK330	Electrolytic 10V 33	1	
C3103	ECEA1HKR47	Electrolytic 50V 0.47	1	
C3104-3106	ECEA1AK330	Electrolytic 10V 33	3	
C3107	ECEA1HKR47	Electrolytic 50V 0.47	1	
C3108	ECKW1H561KB2	Ceramic 50V 560	1	
C3112	ECEA1HKNR47	Electrolytic 50V 0.47	1	
C3120	ECCR1H331J	Ceramic 50V 330	1	
C3126	ECKR1H103ZF5	Ceramic 50V 0.01	1	
		Short Plug		
P301-303	EMCS0252M	2P	3	
P309	EMCS0451ML	4P	1	
P310	EMCS0652M	6P	1	
P313	EMCS0752M	7P	1	
P314	EMCS0352M	3P	1	
		Coils		
L301-303	EL0606SK-150K	15μH	3	
L305	EL0606SK-101K	100μH	1	
L307,308	EL0606SK-150K	15μH	2	
L309	EL0606SK-331K	330μH	1	
L310	EL0606SK-101K	100μH	1	
L311	EL0606SK-151K	150μH	1	
L312	TLT102-999G	1mH	1	
L313	EL0606SK-101K	100μH	1	
L314	VLQ7H101K	100μH	1	
L315	EL0606SK-270K	27μH	1	
L316	VLQ7H101K	100μH	1	
L317	EL0606SK-150K	15μH	1	

Ref. No.		Part No.	Part Name & Description	Pcs / Set	Remarks
L318		EL0606SK-270K	27μH	1	
L319,320		EL0606SK-150K	15μH	2	
L321,322		EL0606SK-151K	150μH	2	
			Filters		
LC301		ELB5E006		1	
LC302		ELB5F002		1	
LC303		ELT7F004		1	
LC304,305		ELB5E005		2	
X301		EFCA3R58MB3		1	
X302		VSXK0065		1	
			Delay Lines		
DL301		EFDPN645B85B		1	
DL302		ELB5F013		1	
DL303		ELB5E013		1	
DL304		EFDMN645B85B		1	
		VEKW0207	2P Connector Ass'y	1	
		VEKW0210	2P Connector Ass'y	1	
		VEKW0211	2P Connector Ass'y	1	
		VEKW0224	4P Connector Ass'y	1	
		VEKW0227	5P Connector Ass'y	1	
			DEFLECTION C.B.A.		
			Integrated Circuits		
IC601		AN6050		1	
IC602		AN374P		1	
IC603		MN6069		1	
			Transistors		
Q601		2SD662(Q,R)		1	
Q602		2SD636(Q,R)		1	
Q603		2SB641(Q,R)		1	
Q604		2SC1565A(Q,R)		1	
Q605,606		2SD662(Q,R)		2	
Q607		2SD636(Q,R)		1	
Q608		2SA1018(Q,R)		1	
Q609		2SD662(Q,R)		1	
Q610,611		2SB641(Q,R)		2	
Q612		2SD662(Q,R)		1	
Q613		2SD636(Q,R)		1	
Q614		2SA1018(Q,R)		1	
Q615		2SB642(Q,R)		1	
Q616		2SD636(Q,R)		1	
Q617-619		2SB641(Q,R)		3	
Q620		2SD662(R)		1	
Q621		2SB641(Q,R)		1	
Q622		2SD669A		1	
Q623,624		2SD636(Q,R)		2	
Q625,626		2SD636(R)		2	
Q632		2SB641(S,T)		1	

Ref. No.		Part No.	Part Name & Description	Pcs / Set	Remarks
Q633,634		2SD636(R,S)		2	
Q635		2SD636(Q,R)		1	
Q636		2SD639(Q,R)		1	
Q638		2SA684(R,S)		1	
Q639,640		2SD661(T,U)		2	
Q645		2SB641(Q,R)		1	
Q648		2SB641(Q,R)		1	
Q650		2SD636(Q,R)		1	
Q651		2SB641(Q,R)		1	
Q652,653		2SD636(Q,R)		2	
			Diodes		
D601		MA165		1	
D602		ERB28-04D		1	
D603		ERB28-06D		1	
D604,605		ERB28-04D		2	
D606-608		MA165		3	
D609		MZL306B		1	
D610,611		ERB12-01		2	
D612		RD6.2E		1	
D614		MA165		1	
D619		MA165		1	
D626		MA165		1	
			Resistors		
R601		ERD10TJ823	82K	1	
R602		ERD10TJ123	12K	1	
R603		ERD10TJ153	15K	1	
R604		ERD10TJ682	6.8K	1	
R605		ERD10TJ681	680	1	
R606		ERD10TJ222	2.2K	1	
R607		ER050CKF5603	1/2W 560K	1	
R608		ERD10TJ224	220K	1	
R609		ERD10TJ823	82K	1	
R610		ERD10TJ102	1K	1	
R611		ERD10TJ472	4.7K	1	
R612		ERD10TJ331	330	1	
R613		ERD10TJ100	10	1	
R614		ERD10TJ470	47	1	
R615		ERD10TJ682	6.8K	1	
R616		ERD10TJ103	10K	1	
R617		ERD10TJ682	6.8K	1	
R618		ERD10TJ334	330K	1	
R620		ERD10TJ223	22K	1	
R621		ERD10TJ104	100K	1	
R622		ERD10TJ332	3.3K	1	
R623		ERD10TJ272	2.7K	1	
R624		ERD10TJ392	3.9K	1	
R625		ERD10TJ682	6.8K	1	
R626		ERD10TJ153	15K	1	
R627		ERD10TJ182	1.8K	1	
R628,629		ERD10TJ682	6.8K	2	
R630		ERD10TJ182	1.8K	1	
R631		ERD10TJ392	3.9K	1	
R632		ERD10TJ123	12K	1	
R633		ERD10TJ473	47K	1	
R634		ERD10TJ333	33K	1	
R635		ERD10TJ682	6.8K	1	
R636		ERD10TJ822	8.2K	1	
R637		ERD10TJ182	1.8K	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R638	ERD10TJ333	33K	1	
R639	ERD10TJ472	4.7K	1	
R640	ERD10TJ102	1K	1	
R641	ERD10TJ223	22K	1	
R642	ERD10TJ273	27K	1	
R643	ERD10TJ822	8.2K	1	
R644	ERD10TJ472	4.7K	1	
R645	ERD10TJ153	15K	1	
R646	ERD10TJ472	4.7K	1	
R647	ERD10TJ103	10K	1	
R648,649	ERD10TJ272	2.7K	2	
R650,651	ERD10TJ472	4.7K	2	
R652	ERD10TJ153	15K	1	
R653	ERD10TJ272	2.7K	1	
R654	ERD10TJ103	10K	1	
R655	ERD10TJ272	2.7K	1	
R656	ERD10TJ472	4.7K	1	
R657	ERD10TJ333	33K	1	
R658,659	ERD10TJ472	4.7K	2	
R660	ERD10TJ223	22K	1	
R661	ERD10TJ331	330	1	
R662	ERD10TJ272	2.7K	1	
R663	ERD10TJ153	15K	1	
R664	ERD12TJ300 or	1/2W 30	1	
	ERD50TJ300			
R665	ERD10TJ222	2.2K	1	
R666	ERD10TJ183	18K	1	
R667	ERD10TJ562	5.6K	1	
R668	ERD10TJ102	1K	1	
R669	ERD10TJ223	22K	1	
R670	ERD10TJ221	220	1	
R671	ERD10TJ121	120	1	
R672	ERD10TJ220	22	1	
R673	ERD10TJ391	390	1	
R674	ERD10TJ332	3.3K	1	
R675	ERD10TJ472	4.7K	1	
R676	ERD10TJ152	1.5K	1	
R677	ERD10TJ104	100K	1	
R678	ERD10TJ124	120K	1	
R679	ERD10TJ272	2.7K	1	
R680	ERD10TJ103	10K	1	
R687	ERD10TJ682	6.8K	1	
R688	ERD10TJ222	2.2K	1	
R689	ERD10TJ562	5.6K	1	
R690	ERD10TJ392	3.9K	1	
R691	ERD10TJ562	5.6K	1	
R692	ERD10TJ823	82K	1	
R693	ERD25TJ471	1/4W 470	1	
R695	ERD10TJ223	22K	1	
R696	ERD10TJ332	3.3K	1	
R697	ERD10TJ103	10K	1	
R698	ERD10TJ330	33	1	
R699	ERG1ANJ151	1W 150	1	
R6100	ERD10TJ472	4.7K	1	
R6105	ERD10TJ562	5.6K	1	
R6106	ERD10TJ181	180	1	
R6107	ERD10TJ333	33K	1	
R6108	ERD10TJ122	1.2K	1	
R6109	ERD10TJ562	5.6K	1	
R6110	ERD10TJ223	22K	1	
R6111	ERD10TJ561	560	1	
R6112	ERD10TJ101	100	1	
R6114	ERD10TJ183	18K	1	
R6115	ERD10TJ332	3.3K	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R6116	ERD10TJ681	680	1	
R6117	ERD10TJ100	10	1	
R6120	ERD10TJ223	22K	1	
R6121	ERD10TJ154	150K	1	
R6126	ERD10TJ393	39K	1	
R6129	ERD10TJ154	150K	1	
R6133	ERD10TJ103	10K	1	
R6134,6135	ERD10TJ153	15K	2	
R6137,6138	ERD10TJ153	15K	2	
R6147-6150	ERD10TJ104	100K	4	
R6151,6152	ERD10TJ102	1K	2	
R6204,6205	ERD10TJ682	6.8K	2	
R6206,6207	ERD10TJ682	6.8K	2	
R6208	ERD10TJ102	1K	1	
R6209	ERD10TJ333	33K	1	
R6210	ERD10TJ103	10K	1	
R6211	ERD10TJ102	1K	1	
R6212	ERD10TJ682	6.8K	1	
R6213,6214	ERD10TJ153	15K	2	
R6216	ERD10TJ123	12K	1	
R6217,6218	ERD10TJ102	1K	2	
R6219	ERD10TJ153	15K	1	
R6220	ERD10TJ333	33K	1	
R6221	ERD10TJ102	1K	1	
R6226	ERD10TJ562	5.6K	1	
R6222	ERD10TJ101	100	1	
R6223	ERD10TJ331	330	1	
R6228	ERD10TJ562	5.6K	1	
R6229	ERD10TJ152	1.5k	1	
		Variable Resistors		
VR601	EVM38GA00B16	1M	1	
VR602	EVM38GA00B35	300K	1	
VR603	EVN38CA00B34	30K	1	
VR604	EVM38GA00B16	1M	1	
VR605	EVM38GA00B55	500K	1	
VR606-611	EVN38CA00B53	5K	6	
VR612-615	EVN38CA00B14	10K	4	
VR616	EVN38CA00B12	100	1	
VR617	EVN38CA00B53	5K	1	
VR618	EVN38CA00B34	30K	1	
VR619	EVN38CA00B33	3K	1	
VR620	EVN38CA00B13	1K	1	
VR624-627	EVN38CA00B14	10K	4	
		Capacitors		
C601	ECEA2AS010	Electrolytic 100V 1	1	
C602	ECQM1H222MZ	Mylar 50V 0.0022	1	
C603	ECQV05154JZW	Mylar 50V 0.15	1	
C604	ECCR1H271J5	Ceramic 50V 270P	1	
C605	ECEA1AK330	Electrolytic 10V 33	1	
C606	ECEA1AK470	Electrolytic 10V 47	1	
C607	ECQM1H472MZ	Mylar 50V 0.0047	1	
C608	ECSF35E2R2	Tantalum 35V 2.2	1	
C609,610	ECEA1CK100	Electrolytic 16V 10	2	
C611	ECQM1H272MZ	Mylar 50V 0.0027	1	
C612	ECSF10E47	Tantalum 10V 47	1	
C613	ECQM1H472MZ	Mylar 50V 0.0047	1	
C614	ECQM1H102MZ	Mylar 50V 0.001	1	
C615	ECEA1CK100	Electrolytic 16V 10	1	
C616	ECQM1H103MZ	Mylar 50V 0.01	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
C617	ECEA1ASS221	Electrolytic 10V 220	1	
C618	ECEA1AK470	Electrolytic 10V 47	1	
C619	ECQF6152KZ	Mylar 630V 0.0015	1	
C621	ECQE10472MV	Mylar 1kV 0.0047	1	
C622	ECEA450V1	Electrolytic 450V 1	1	
C623	ECQM4472MZ	Mylar 400V 0.0047	1	
C624-626	ECEA160V1	Electrolytic 160V 1	3	
C627	ECEA1ASS101	Electrolytic 10V 100	1	
C628	ECEA1HK100	Electrolytic 50V 10	1	
C629	ECQE4473MZ	Mylar 400V 0.047	1	
C630	ECEA1ASS101	Electrolytic 10V 100	1	
C631	ECEA2AS010	Electrolytic 100V 1	1	
C632	ECQM4472MZ	Mylar 400V 0.0047	1	
C634,635	ECEA1CN100S	Electrolytic 16V 10	2	
C636	ECQF6152KZ	Mylar 630V 0.0015	1	
C637	ECEA1AK470	Electrolytic 10V 47	1	
C638	ECEA1HK3R3	Electrolytic 50V 3.3	1	
C639	ECQV05393JZ	Mylar 50V 0.039	1	
C640	ECEA1HK3R3	Electrolytic 50V 3.3	1	
C641	ECCR1H391J5	Ceramic 50V 390	1	
C642	ECQM1H102MZ	Mylar 50V 0.001	1	
C643	ECCR1H121J5	Ceramic 50V 120P	1	
C644	ECKR1H102KB5	Ceramic 50V 1000P	1	
C645	ECEA1ASS101	Electrolytic 10V 100	1	
C646	ECEA1AK470	Electrolytic 10V 47	1	
C647	ECSF10E47	Tantalum 10V 47	1	
C648	ECSF6E68	Tantalum 6.3V 68	1	
C649	ECQM1H472MZ	Mylar 50V 0.0047	1	
C650	ECCW1H561J5	Ceramic 50V 560	1	
C651	ECCW1H181J	Ceramic 50V 180	1	
C652,653	ECEA1HK010	Electrolytic 50V 1	2	
C654	ECQV05563JZ	Mylar 50V 0.056	1	
C655	ECCW1H561J5	Ceramic 50V 560	1	
C658	ECEA1ASS221	Electrolytic 10V 220	1	
C660	ECEA1ESS470	Electrolytic 25V 47	1	
C661	ECCR1H221J5	Ceramic 50V 220P	1	
C662	ECEA1HK010	Electrolytic 50V 1	1	
C663	ECEA1HN010S	Electrolytic 50V 1	1	
C664	ECEA0JK330	Electrolytic 6.3V 33	1	
C665	ECEA1ASS221	Electrolytic 10V 220	1	
C666	ECEA1ASS101	Electrolytic 10V 100	1	
C667	ECQM1H472MZ	Mylar 50V 0.0047	1	
C668	ECEA1EK100	Electrolytic 25V 10	1	
C669	ECEA1ASS101	Electrolytic 10V 100	1	
C670	ECSF35E2R2	Tantalum 35V 2.2	1	
C672	ECEA1CK220	Electrolytic 16V 22	1	
C673	ECEA1HK3R3	Electrolytic 50V 3.3	1	
C674	ECQS5331J	Mylar 500V 330P	1	
C680	ECCR1H101J5	Ceramic 50V 100	1	
C681	ECCR1H820J5	Ceramic 50V 82	1	
C682	ECCW1H470J5	Ceramic 50V 47	1	
C684	ECQV05104JZ	Mylar 50V 0.1	1	
C687	ECKR1H102KB5	Ceramic 50V 0.001	1	
C688	EDDR1H101J5	Ceramic 50V 100	1	
C689	ECCR1H221J5	Ceramic 50V 220P	1	
C690	ECCR1H821J5	Ceramic 50V 820P	1	
C6125	ECEA1EK220	Electrolytic 25V 22	1	
		Coils		
L601,602	VLQ7H101K	100μH	2	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
L603,604	VLQ9H333J	33μH	2	
L605	EL0606SK-101K	100μH	1	
		Switch		
SW601	(VSSW0014)		1	
		Short Plug		
P601	EMCS0352M	3P	1	
P602	EMCS0652M	6P	1	
P603	EMCS0352M	3P	1	
P604	EMCS0652M	6P	1	
P608	EMCS0352M	3P	1	
P609	EMCS0252M	2P	1	
P610	EMCS0352M	3P	1	
P611	EMCS0251ML	2P	1	
P614	EMCS0252M	2P	1	
P615	EMCS0552M	5P	1	
P616	EMCS0451ML	4P	1	
P617-620	EMCS0252M	2P	4	
P622	EMCS0752M	7P	1	
P623	EMCS0251ML	2P	1	
P624	EMCS0452M	4P	1	
P626	EMCS0252M	2P	1	
T601	VEKW0201	FBT Ass'y	1	
F601	XBA1C15NV100	Fuse	1	
	TJC6320	Fuse Holder	2	
	VEKW0219	3P Connector Ass'y	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		Transistor		
Q655	2SA768(Q,R) or	Power Transistor	1	
	2SB761(P,Q)			
	S4094	Vidicon	1	
	ELY18A208B	DY	1	
	VEKW0204	Camera Cable Ass'y	1	
	VEKW0231	EXT Mic. Ass'y	1	
	VEKW0230	Power Transistor Ass'y	1	
	VEKW0232	8P Socket Ass'y	1	
	VEKW0233	10P Socket Ass'y	1	
	VEKW0258	EXT. REMO. CON Socket Ass'y	1	
	VEKW0260	Moter Ass'y	1	
		FADER C.B.A.		
		Transistors		
Q401	2SB641(R)		1	
Q402,403	2SD636(R)		2	
Q404-406	2SB641(R)		3	
Q407	2SD636(R)		1	
Q410-413	2SD636(R)		4	
Q414	2SD636(Q,R)		1	
Q415,416	2SB641(Q,R)		2	
		Diodes		
D401,402	MA165		2	
D404-410	MA165		7	
D411	RD6.2E		1	
D412	MA165		1	
D413	OA90		1	
D414	MA165		1	
		Resistors		
R401	ERD10TJ333	33K	1	
R402	ERD10TJ101	100	1	
R403	ERD10TJ471	470	1	
R404	ERD10TJ392	3.9K	1	
R405	ERD10TJ103	10K	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R407	ERD10TJ103	10K	1	
R409	ERD10TJ683	68K	1	
R410	ERD10TJ103	10K	1	
R411	ERD10TJ472	4.7K	1	
R412	ERD10TJ273	27K	1	
R413	ERD10TJ183	18K	1	
R414	ERD10TJ684	680K	1	
R415	ERD10TJ273	27K	1	
R418	ERD10TJ472	4.7K	1	
R419	ERD10TJ103	10K	1	
R420	ERD10TJ392	3.9K	1	
R421	ERD10TJ153	15K	1	
R423	ERD10TJ391	390	1	
R424	ERD10TJ273	27K	1	
R426	ERD10TJ103	10K	1	
R427	ERD10TJ392	3.9K	1	
R429	ERD10TJ153	15K	1	
R430	ERD10TJ273	27K	1	
R431,432	ERD10TJ223	22K	2	
R433	ERD10TJ104	100K	1	
R434	ERD10TJ123	12K	1	
R435	ERD10TJ822	8.2K	1	
		Capacitors		
C402	ECEA1HK010	Electrolytic 50V 1	1	
C403	ECEA1CK100	Electrolytic 16V 10	1	
C404	ECEA1ASS101	Electrolytic 10V 100	1	
C405	ECEA1AK330	Electroltyic 10V 33	1	
C406	ECEA1ASS101	Electrolytic 10V 100	1	
C407	ECEA1AK330	Electrolytic 10V 33	1	
C409	ECEA1HKR47	Electrolytic 50V 0.47	1	
C410	ECEA1CK100	Electrolytic 16V 10	1	
		Connectors		
P401	EMCS0252M	2P	1	
P402	EMCS0452M	4P	1	
P404	EMCS0352M	3P	1	
	VEKW0208	2P Connector Ass'y	1	

Ref. No.		Part No.	Part Name & Description	Pcs / Set	Remarks
			REAR SIDE C.B.A.		
		VJBW0065	Printed Circuit Board	1	REAR SIDE PCB
			Variable Resistor		
VR801		EVJ3LA309B24	20K	1	
SW801-803		VSSW0015		3	
			Connectors		
		VEKW0220	3P Connector Ass'y	1	
		VEKW0221	3P Connector Ass'y	1	
		VEKW0223	4P Connector Ass'y	1	
		VEKW0213	2P Connector Ass'y	1	
			A.W.C. C.B.A.		
			IC		
IC701		AN6914		1	
			Transistors		
Q701		2SB641(Q,R)		1	
Q702		2SD636(Q,R)		1	
Q703		2SB641(Q,R)		1	
Q704		2SD636(Q,R)		1	
Q705		2SB641(Q,R)		1	
Q706		2SD636(Q,R)		1	
Q707		2SD636(Q,R)		1	
Q708		2SD636(Q,R)		1	
			Diodes		
D701		RD4.7E		1	
D702		MA165		1	
			Resistors		
R701		ERD10TJ562	5.6K	1	
R702		ERD10TJ561	560	1	
R703		ERD10TJ152	1.5K	1	

Ref. No.		Part No.	Part Name & Description	Pcs / Set	Remarks
R704		ERD10TJ332	3.3K	1	
R705		ERD10TJ272	2.7K	1	
R706		ERD10TJ103	10K	1	
R707		ERD10TJ153	15K	1	
R708		ERD10TJ682	6.8K	1	
R709		ERD10TJ562	5.6K	1	
R710		ERD10TJ102	1.0K	1	
R711		ERD10TJ102	1.0K	1	
R712		ERD10TJ332	3.3K	1	
R713		ERD10TJ272	2.7K	1	
R714		ERD10TJ332	3.3K	1	
R715		ERD10TJ332	3.3K	1	
R717		ERD10TJ222	2.2K	1	
R718		ERD10TJ222	2.2K	1	
R719		ERD10TJ104	100K	1	
R720		ERD10TJ104	100K	1	
R721		ERD10TJ472	4.7K	1	
R722		ERD10TJ472	4.7K	1	
			Variables		
VR701		EVN30CA00B33	3K	1	
VR702		EVN30CA00B33	3K	1	
			Capacitors		
C701		ECEA1HK3R3	Electrolytic 50V 3.3	1	
C702		ECEA1HK3R3	Electrolytic 50V 3.3	1	
C703		ECEA1HKNR47	Electrolytic 50V 0.47	1	
C704		ECEA1HKNR47	Electrolytic 50V 0.47	1	
C705		ECEA1AK470	Electrolytic 10V 47	1	
C706		ECQV05104JZ	Mylar 50V 0.1	1	
C707		ECEA1AK470	Electrolytic 10V 47	1	
C708		ECQV05104JZ	Mylar 50V 0.1	1	
C709		ECKR1H103ZF5	Ceramic 50V 0.01	1	
C710		ECKR1H103ZF5	Ceramic 50V 0.01	1	
		VJBW0062	Printed Circuit Board	1	AWC PCB
		VEKW0214	2P Connector Ass'y	1	
		VEKW0215	2P Connector Ass'y	1	
		VEKW0228	6P Connector Ass'y	1	
			Miscellaneous		
		VEKW0234	10P Cable Ass'y	1	
		40JB4	CRT	1	
		ELY15V106A	DY	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		A.W.C. SW C.B.A.		
	VJBW0066	Printed Circuit Board	1	AWC SW PCB
	VSSW0010	AWC SW	1	
	VEKW0212	2P Connector Ass'y	1	
		PRE-AMP C.B.A.		
		Integrated Circuit		
IC201	K720A72F		1	
		Transistor		
Q201	2SK218(Q)		1	
		Diode		
D201	MA26		1	
		Resistors		
R201	ERD25TJ565	1/4W 5600K	1	
R202	ER050CKF2704	1/2W 2.7M	1	
R203	ERD10TJ124	120K	1	
R204	ERD10TJ181	180	1	
R205	ERD10TJ561	560	1	
R206	ERD10TJ104	100K	1	
R207	ERD10TJ682	6.8K	1	
		Capacitors		
C201	VCAMX100V223K	Mylar 100V 0.022	1	
C202	ECQE1104KN	Mylar 100V 0.1	1	
C203	ECSF6E47	Tantalum 6.3V 47	1	
C204	ECSF10E47	Tantalum 10V 47	1	
C205	VCAMX50V102K	Mylar 50V 0.001	1	
C206	ECSF10E10	Tantalum 10V 10	1	
C207	ECSF10E47	Tantalum 10V 47	1	
C208	ECSF10E10	Tantalum 10V 10	1	
C209	ECSF35ER47	Tantalum 35V 0.47	1	
C210	ECCW1H080CC5	Ceramic 50V 8P	1	
C211	ECCW1H470JC5	Ceramic 50V 47P	1	
C212	ECV1ZW40X53N	Trimmer 1W 40P	1	
		Coils		
L201	ELT-12R004	270	1	
L202	EL0606SK-101K	100	1	
	VEKW0206	2P Connector Ass'y	1	
	VEKW0216	3P Connector Ass'y	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		REMO. CON. SW C.B.A.		
	VJBW0067	Printed Circuit Board	1	
	ESB-6223	Remote Control Switch	1	
	VEKW0205	2P Connector Ass'y	1	
		VIDICON SOCKET C.B.A.		
			1	
	VJBW0082	Printed Circuit Board	1	VIDICON SOCKET PCB
C620	VEKW0161	Condenser Ass'y	1	
	VJSK1116	Socket	1	
		A.L.C. C.B.A.		
		Integrated Circuit		
IC501	AN6552		1	
		Transistor		
Q501	2SD636(Q,R)		1	
Q502	2SB641(Q,R)		1	
Q503	2SD636(Q,R)		1	
		Diode		
D501	MA26W		1	
		Resistors		
R501	ERD10TJ562	5.6K	1	
R502	ERD10TJ272	2.7K	1	
R503	ERD10TJ683	68K	1	
R504	ERD10TJ562	5.6K	1	
R505	ERD10TJ153	15K	1	
R506	ERD10TJ153	15K	1	
R507	ERD10TJ101	100	1	
R508	ERD10TJ152	1.5K	1	
R509	ERD10TJ104	150K	1	
R510	ERD10TJ152	1.5K	1	
R511	ERD10TJ152	1.5K	1	
R512	ERD10TJ471	470	1	
R513	ERD10TJ562	5.6K	1	
R514	ERD10TJ223	22K	1	
R515	ERD10TJ822	8.2K	1	
R516	ERD10TJ332	3.3K	1	
R517	ERD10TJ152	1.5K	1	
		Variable		
VR501	EVN-30CA00B53	5K	1	
VR502	EVN-30CA00B53	5K	1	
VR503	VSSW0007	2.2K	1	

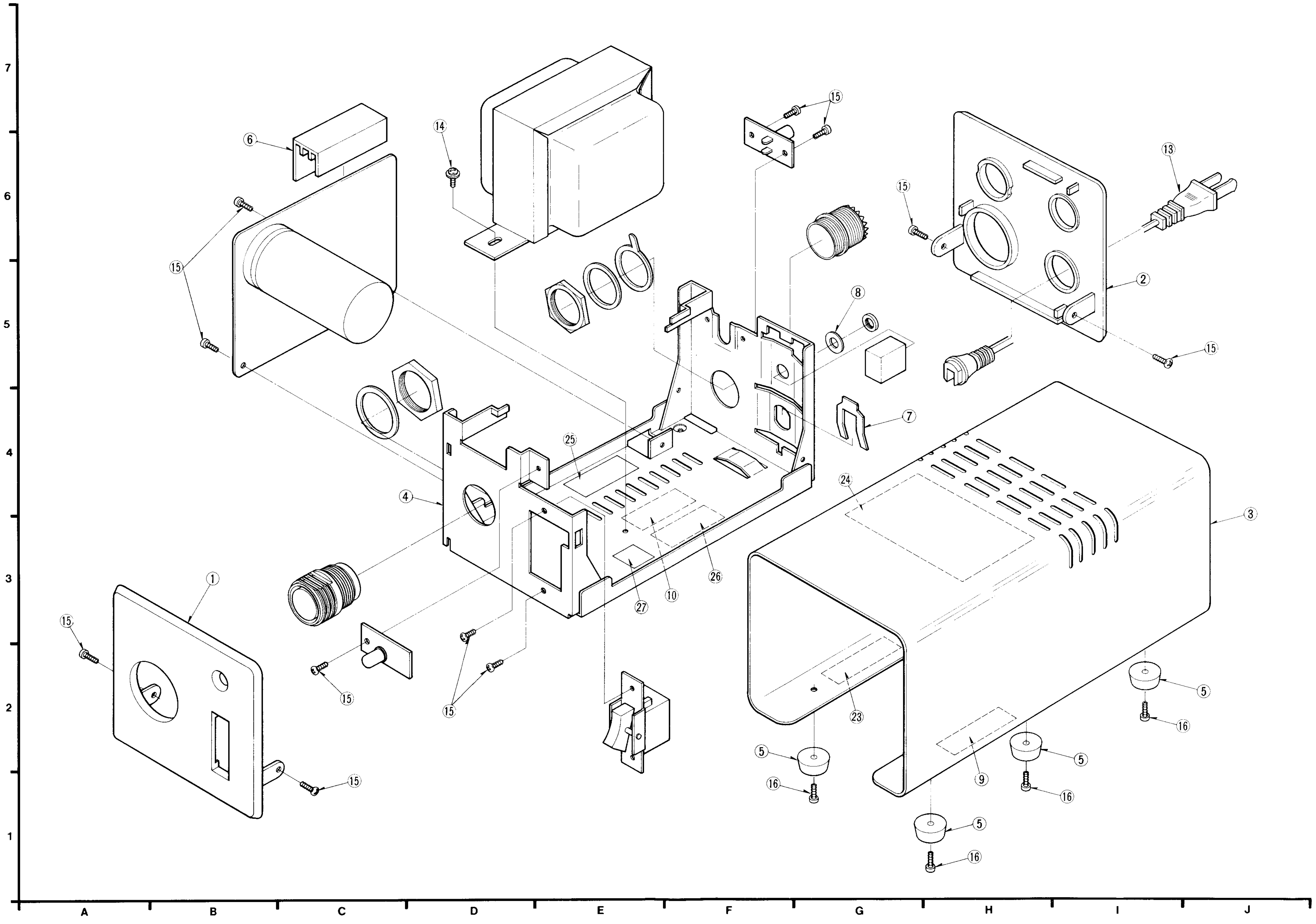
Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		Capacitor		
C501	ECEA16N10U	Electrolytic 16V 10	1	
P501	EMCS0452M	4P Short Plug	1	
P502	EMCS0452M	4P Short Plug	1	
	VJBW0063	Printed Circuit Board	1	ALC PCB
	VEKW0177	7P Connector Ass'y	1	
			1	
		EVF H. C.B.A.		
		Transistors		
Q906	2SB642(Q,R)		1	
Q907	2SD636(Q,R)		1	
Q908	2SC1567(Q,R)		1	
Q9100	2SD636(Q,R)		1	
Q9101	2SD636(Q,R)		1	
Q9102	2SD636(Q,R)		1	
		Diodes		
D903-906	MA165		4	
D907	S1B01-01		1	
D908	RA-1SF or ES-1F		1	
D909	S1B1-01		1	
D811	BR5704S		1	
		Resistors		
R933	ERD10TJ332	3.3K	1	
R934	ERD10TJ563	56K	1	
R935	ERD10TJ103	10K	1	
R936	ERD10TJ391	390	1	
R937	ERD10TJ222	2.2K	1	
R938	ERD10TJ272	2.7K	1	
R939	ERD10TJ393	39K	1	
R940	ERD10TJ270	27	1	
R941	ERD10TJ331	330	1	
R942	ERD10TJ102	1K	1	
R943	ERD10TJ102	1K	1	
R945	ERD10TJ152	1.5K	1	
R946	ERD25VJ101	1/4W 100	1	
R947	ERD25VJ334	1/4W 330K	1	
R948	ERD25VJ275	1/4W 2.7M	1	
R949	ERD25TJ105	1/4W 1M	1	
R952	ERD10TJ105	1M	1	
R953	ERD10TJ330	33	1	
R954	ERD10TJ334	330K	1	
R955	ERD10TJ394	390K	1	
R9100	ERD10TJ471	470	1	
R9101	ERD10TJ102	1K	1	
R9102	ERD10TJ823	82K	1	
R9103	ERD10TJ823	82K	1	
R9104	ERD10TJ102	1K	1	
R9105	ERD10TJ562	5.6K	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		Variable		
VR901	EVTV2C10KB13	1K	1	
VR903	CR-19R2.2MB or EVMH1GA00B26	2.2M	1	
VR904	EVTV2C10KB55	500K	1	
		Capacitors		
C920	ECQV05103JZ	Mylar 50V 0.01	1	
C921	ECEA1HK3R3	Electrolytic 50V 3.3	1	
C922	ECQV05223JZ	Mylar 50V 0.022	1	
C923	ECQV05154JZ	Mylar 50V 0.15	1	
C924	ECEA1CK100	Electrolytic 16V 10	1	
C925	VCAMS100V472J	Mylar 100V 0.0047	1	
C926	ECEA1CS471S	Electrolytic 10V 470	1	
C928	ECQE1104KN	Mylar 100V 0.1	1	
C929	ECKD3A392KB2	Ceramic 1kV 0.0039	1	
C930	VCMK0007	Mylar 200V 0.1	1	
C931	ECKD3A152KB2	Ceramic 1kV 0.0015	1	
C933	ECQV05683JZ	Mylar 50V 0.068	1	
C934	ECEA1JS100	Electrolytic 63V 10	1	
C9100	ECEA1CK100	Electrolytic 16V 10	1	
C9102,9103	ECEA1HK010	Electrolytic 50V 1	2	
		Coils		
L903	VLQ7H101K	100µH	1	
L904	VLQ9H391K	390µH	1	
L905	TLH-6307-1		1	
SW902	VSSW0012	REMO.CON.SW	1	
P902	EMCS0752M	7P Short Plug	1	
T901	ETF18L12A	FBT	1	
	VJBW0071	Printed Circuit Board	1	EVF H PCB
	VEKW0240	CRT Socket Ass'y	1	
	VEKW0235	5P Connector Ass'y	1	
	VMGW0025	Diode Holder	1	

Ref. No.		Part No.	Part Name & Description	Pcs / Set	Remarks
			EVF V. C.B.A.		
			Integrated Circuit		
IC901		AN374P		1	
			Transistors		
Q801		2SD973(Q,R)		1	
Q901		2SD636(R,S)		1	
Q902		2SD662(Q,R)		1	
Q903		2SB642(Q,R)		1	
Q904		2SD637(R,S)		1	
Q905		3SF11(Q)		1	
			Diode		
D901-902		MA165		2	
			Resistors		
R801		ERD10TJ392	3.9K	1	
R802		ERD10TJ681	680	1	
R803		ERD10TJ222	2.2K	1	
R804		ERD10TJ472	4.7K	1	
R805		ERD10TJ100	10	1	
R806		ERD10TJ470	47	1	
R901		ERD10TJ683	68K	1	
R902		ERD10TJ153	15K	1	
R903		ERD10TJ222	2.2K	1	
R904		ERD10TJ821	820	1	
R905		ERD10TJ152	1.5K	1	
R906		ERD10TJ333	33K	1	
R907		ERD10TJ332	3.3K	1	
R908		ERD10TJ331	330	1	
R909		ERD10TJ123	12K	1	
R911		ERD10TJ151	150	1	
R912		ERD10TJ334	330K	1	
R913		ERD10TJ391	390	1	
R915		ERD10TJ153	15K	1	
R916		ERD10TJ332	3.3K	1	
R917		ERD10TJ223	22K	1	
R918		ERD10TJ472	4.7K	1	
R919		ERD10TJ683	68K	1	
R920		ERD10TJ101	100	1	
R921		ERD10TJ102	1K	1	
R922		ERD10TJ334	330K	1	
R923		ERD10TJ334	330K	1	
R924		ERD10TJ562	5.6K	1	
R925		ERD10TJ223	22K	1	
R926		ERD10TJ333	33K	1	
R927		ERD10TJ153	15K	1	
R928		ERD10TJ822	8.2K	1	
R929		ERD10TJ103	10K	1	
R930		ERD10TJ223	22K	1	
R931		ERD10TJ2R2	2.2	1	
R932		ERD10TJ102	1K	1	
R950		ERD10TJ152	1.5K	1	
R951		ERD10TJ105	1M	1	
R9106		ERD10TJ102	1K	1	

Ref. No.		Part No.	Part Name & Description	Pcs / Set	Remarks
			Variable		
VR902		EVN-38CA00B52	500	1	
			Capacitors		
C802		ECEA1AK470	Electrolytic 10V 47	1	
C803		ECQV05104JZ		1	
C901		ECEA1AS101	Electrolytic 10V 100	1	
C902		ECEA1CN100S	Electrolytic 16V 10	1	
C903		ECCF1H271J	Ceramic 50V 270	1	
C905		ECEA1AK470	Electrolytic 10V 47	1	
C906		ECKR1H122KB2	Ceramic 50V 0.0012	1	
C907		ECEA1HK3R3	Electrolytic 50V 3.3	1	
C908		ECQV05103JZ	Mylar 50V 0.01	1	
C909		ECEA1HNR47S	Electrolytic 50V 0.47	1	
C910		ECEA1CK330	Electrolytic 16V 33	1	
C911		ECCR1H100D5	Ceramic 50V 10	1	
C912		ECEA1JS220	Electrolytic 63V 22	1	
C913		ECEA1CS471S	Electrolytic 16V 470	1	
C914		ECSF10E2R2	Tantalum 10V 2.2	1	
C915		ECSF10E10	Tantalum 10V 10	1	
C916		ECQV05103JZ	Mylar 50V 0.01	1	
C917		ECEA1HK3R3	Electrolytic 50V 3.3	1	
C918		ECEA0JS102S	Electrolytic 6.3V 1000	1	
C919		VCAMS50V272J	Mylar 50V 0.0027	1	
C932		ECQE2104KS	Mylar 250V 0.1	1	
SW901		VSSW0011	R.L. SW	1	
			Coil		
L902			KLH-5A	1	
P901		EMCS0452M	4P Connector	1	
		VEKW0237	7P Connector Ass'y	1	
		VEKW0239	7P Connector Ass'y	1	
			ZOOM SW C.B.A.		
		VEKW0238	7P Connector Ass'y	1	
			LED SW C.B.A.		
D910		LN43SYP		1	
D911		LN33SGP(H)	Diode	1	
		VEKW0254	Ground Spring Ass'y	1	
		VEKW0236	5P Connector Ass'y	1	
D912		SG207D	Diode	1	
		VXFW0006	Diode Holder	1	

❶ Power Supply Unit Section (optional accessory)



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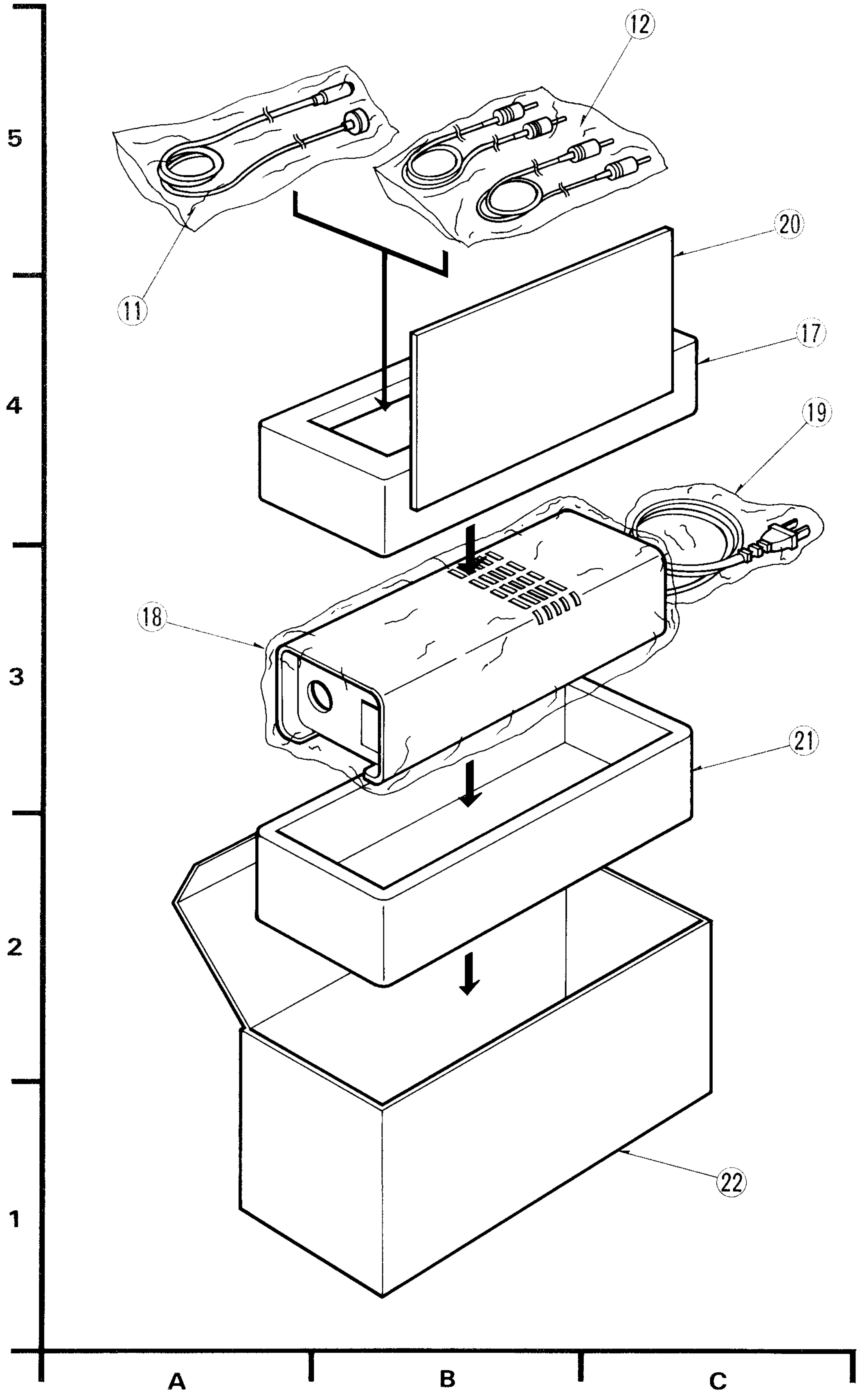
❷ *Packing Parts Section*



MECHANICAL REPLACEMENT PARTS LIST

Note: *Be sure to make your orders of replacement parts according to this list.
○ . . . . Available replacement part
X . . . . Not available as replacement
☐ . . . . Only available on special order

Item No.	Drawing No.	Description	Pcs/ Set	Availability	Part No.	Remark
		PSU				
1		PSU FRONT COVER	1	o	VKGW0176	
2		BACK COVER	1	o	VKGW0006	
3		TOP COVER	1	o	VKGW0177	
4		MAIN CHASSIS	1	o	VMKW0001	
5		RUBBER LUG	4	o	VKAW0001	
6		FUSE COVER	1	o	VJFW0001	
7		AC CORD PLATE	1	o	VMAW0018	
8		WASHER	1	o	VMKW0006	
		LABEL				
9		PSU CAUTION LABEL	1	o	VQLW0196	
10		PSU LABEL	1	o	VQLW0222	
		CABLE				
11		VIDEO CABLE ASS'Y	1	o	VFAK0006	
12		AUDIO REMO.CON. CABLE ASS'Y	1	o	VFAK0005	
13		AC CORD	1	o	VJAW0004	
		SCREW				
14		PAN HEAD SCREW WITH SPRING	1	o	XYN4+F6FU	
		PLATE 3ϕ x 8 mm				
15		BIND TAPPING SCREW	11	o	XTB3+6FFU	
		3ϕ x 6 mm				
16		BIND SCREW 3ϕ x 8 mm	4	o	XSB3+8FZ	
		PACKING				
17		CUSHION TOP	1	o	VPGW0006	
18		POLY BAG FOR PSU	1	o	XZB17X27A02	
19		POLY BAG FOR PSU CORD	2	o	XZB10X22A05	
20		FAN BAG KIT	1	o	VQTW0043	
21		CUSHION BOTTOM	1	o	VPGW0007	
22		PSU PACKING CASE	1	o	VPKW0142	
		LABEL				
23		ATTENTION LABEL	1	o	VQLW0001	
24		SERVICEMAN W LABEL	1	o	VQLW0005	
25		FUSE LABEL (CAUTION)	1	o	VQLW0004	
26		FUSE LABEL (ATTENTION)	1	o	VQLW0003	
27		PSU CHASSIS LABEL	1	o	VQLW0074	

ELECTRICAL REPLACEMENT PARTS LIST

Note:
1. Be sure to make your orders of replacement parts according to this list.
2. IMPORTANT SAFETY NOTICE
Components identified by shade have special characteristics important for safety. When replacing any of these components, use only the original ones.
3. Unless otherwise specified:
All resistors are in OHMS (Ω), 1/4 w, ±5% carbon, K = 1,000 Ω, M = 1,000 KΩ.
All capacitors are in MICROFARADS (μF), ±10%, P = μμF.
All coils are in MICROHENRIES (μH), m = 10³
4. C.B.A.: Circuit Board Assembly
5. C.B.: Circuit Board.

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		Power Supply C.B.A.		
		Capacitors		
C101-104	ECKW2H103PE8	500V 0.01	4	
C105	ECET25R103SW	25V 10000	1	
		Diode		
D101	MI-152		1	
D102	MI-152R		1	
D103	LN21RP-TV		1	
	or LN21RPH-TV			
		Resistor		
R101	ERD12TJ561	1/2W 560	1	
F101	XBA1F08NU14A	Fuse	1	
	VSKW0022	Power SW	1	
	VJJK0037	REMO.CON.Socket	1	
	VEKW0157	10 Pin Connector	1	
	ETP57EU23B	Power Transformer	1	
	TJC6319	Fuse Holder	2	